

ANNUAL DIRECTORY NUMBER

McGraw-Hill Publishing Company, Inc.

FEBRUARY, 1940

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AVIATION
January 1940

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WHAT *Will*

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February, 1940

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AVIATION
February, 1940

Lockheed

NEWS OF THE MONTH



LODESTARS FOR MID-CONTINENT

The Lockheed factory hums with the activity of producing great new commercial transports to fill specific needs in airline operations. Above is pictured the construction on one of Mid-Continent Airlines' new Lockheed Lodestars.

Twenty million miles of flying experience is behind their choice of these new Lodestars. Progressive Thomas F. Ryan, III, Mid-Continent president says, "It is of vital importance that we continue to go forward in selecting dependable airplanes. An airline calling at a dozen points within 1500 route miles must consider ruggedness and economy."

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DAILY COMMUTER SERVICE is one of the features of Mid-Continent's airplane network mid-American routes. Passengers can transit full days of business in distant cities yet return by night, the entire United States is within an overnight journey by four connecting transcontinental services.



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Laboratory testing plays an important part in Lockheed airplane construction. A constant check is made on incoming materials, stress calculations on new design parts are checked, suitable materials are determined, load characteristics are studied, weight and strength ratios are improved.

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FOR LEADERSHIP

MEMO
1/19/40

To Purchasing Agent:
Please investigate
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to be just what we need
for our production and
maintenance work.

J. H.
President

JB/v

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Fig. 811 "HALLOWELL" Steel Work Bench with laminated plastic in lines—shown below.



Fig. 1117 "HALLOWELL" Work Bench with no all laminated wood top—shown below.



Fig. 721 "HALLOWELL" Work Bench with an all steel top—shown below. Other model drawings, list prices, are available for sale through all dealers, distributors or trade.

FWD TRUCKS *Reduce* MAINTENANCE COSTS FOR AIRPORTS...

... Pay Big In Year 'Round Maintenance Work

Many of America's leading airports find FWD trucks to be indispensable equipment—equipment that is never idle and yields a big return with a minimum investment. The same FWD trucks that keep runways cleared of snow all winter, find plenty to do on all kinds of airport maintenance duties. Equipped with a special grader attachment, FWD's keep gravel runways in perfect condition—their dependability is important for unloading cash and repair service—FWD speed with safety is needed for refueling duties as well as maintenance work at distant emergency landing fields. Small airports find that one FWD handles the complete all-year maintenance problem—from snow removal in the winter to general hauling and other duties in spring, summer and fall.

FWD specializes in building automotive equipment for airport service. New developments and methods for airport maintenance are scientifically tested for their practicability under actual operating conditions at the Clintonville Municipal Airport.

Investigate FWD trucks—write for full information.

THE FOUR WHEEL DRIVE AUTO COMPANY
CLINTONVILLE, WISCONSIN Canadian Factory: Kitchener, Ontario

FWD trucks are built in sizes ranging from 1½ to 3½ tons capacity in both four-wheel and six-wheel drive, with engines from 82 to 360 horsepower, graduate to dual gearsets. Special gear ratios for heavy snow operation are incorporated into the standard FWD truck performing a year's work from 200 to 400000 miles range and with road speeds of from 40 to 75 miles per hour for high speed operation. Sales and service facilities are available from coast to coast and in all principal overseas countries.

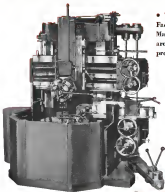


FWD Trucks for Airport Snow Removal and Maintenance.



Many FWD Trucks are used in snow removal—these are other make of truck or tractor.

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• With Time and Accuracy as Factors, "Spindle Drive" and "Cut Master" type Vertical Turret Lathes are the successful answer to your problem.

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Starter Housings, Starter Gears, Intermediate Sections, Crankcase and Rear End Covers, Crankcase Half Main Body, Supercharger Housings, Propeller Hubs, Cam Follower Carriers, Reduction Gears, Front Main Bearing Support, and Diffuser Sections.



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*** and MULT-AU-MATICS

• These machines are used by all Prominent Aeroplane Engine Manufacturers. The parts listed on these two pages are a sample of Bullard scope in this field.

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February, 1946

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Don't Take the Local...
It Makes Too Many Stops

- Drill pilot hole.
- Pick up screw and driver.
- STOP. You dropped the screw.
- Pick up another screw.
- Start driving so very carefully.
- SLOW. It's going in crooked.
- Straighten it out—drive.
- SLOW. The parts are working hard.
- STOP. The screw driver slipped.
- Start again. It's hard going.
- SLOW. You're turning up heat.
- STOP. Can't tighten any further.
- Get file. Smooth off heads.
- Send to reworking department.

Fasten with Phillips Screws
... and Get There
Faster

- Put screw on end of driver.
- Point driver like your finger.
- ZZZZ—it's done.

This space represents time saved by Phillips Recessed Head Screw—which eliminates danger of slipping driver, needs no pilot hole, always drives straight (even with one hand steady work), sets up tight without extra hand or heat.



Two big problems that busy days—customers clamoring for shipments—inspired our new design on the job. They solve both problems by changing the screw fastening device. Phillips Recessed Head Screws are assembly time on average of 50% (according to most reports) make driving easier—make assemblies stronger, better-looking.

Join the thousands of firms—big and small—who have put their assemblies on a new step-basis. Get in touch with one of the firms listed below.

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Speed Product Deliveries by
Cutting Assembly Time

AVIATION
February, 1946

17

Douglas

KEYSTONE OF THE CAPITAL FLEET

Pennsylvania-Central Airlines "goes Douglas" in a big way with its "Capital Fleet" of 21-passenger DC-3s flying the key route of industry between Detroit and Norfolk. Penn-Central's selection of new Douglas equipment for an expanded service in commercial aviation. This leadership is best expressed by the fact that throughout the history of transportation no other public carrier has ever become so standard and universally accepted as the DC-3. Douglas Aircraft Co., Inc., Santa Monica, California.

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SEND FOR FREE LITERATURE

Illustrated folders on Lycoming light-plane engines may be obtained from all Taylorcraft, Piper Cub or Aeronca dealers. Or write Dept. Avia, Lycoming Division, Aviatron Manufacturing Corporation, Williamsport, Pennsylvania, U. S. A. Cable Address: Aviatron.



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Illustrated is the new Lycoming Cond 75 horsepower engine. Other models are of 30, 25 and 20-horsepower. They are all lightweight and so-called—highly reliable and long-lived.

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AVIATION
February, 1947



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who, day after day, deal in dimensions and true measurements for use day for the vision of the most eagle-eyed pilot in the world.

It is all very worth while—because it has made, and keeps, Pioneer Aircraft Instruments the trusted flight companions of all commercial airline crews, of army and navy fliers, and of civilian aviators.

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DIVISION OF BENDIX AVIATION CORPORATION
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AVIATION

February 1940

THE ENGINEER, AIRMAN, AND
AERONAUTICAL MAGAZINE

FEBRUARY 1940

REGULAR EDITION

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Braniff Super B-Liners



Miss Jeanne Ross, E. daughter of T. E. Ross, personally directed the complete new into new styling of Braniff Airways' new Cyclone-powered Douglas Super B-Liners. A business advertisement in new, previous, and more is enhanced by large photographs from the file of 1000 Magazine of cross along Braniff routes to give an impression of effect of appearance.

START the FLYING '40's with WRIGHT CYCLONES

With a new fleet of Wright Cyclone-powered Douglas "Super B-Liners", Braniff Airways enters in a decade which the line's president, Thomas E. Braniff, has aptly termed "The Flying Frontier". The new 21-passenger DC-3's will augment Braniff's B-Liner service with Cyclone-powered DC-2's, in which Cyclones already have logged over 4,000,000 engine miles.

The Super B-Liners have been especially designed for passenger comfort. The color schemes, appointments and improved soundproofing of the airplanes combine to give them the atmosphere of "a home in the sky".

Again, with the introduction of these ships, the Douglas DC-3 has demonstrated its outstanding position in the transportation industry. Again a major airline has re-equipped with Wright Cyclones.

WRIGHT AERONAUTICAL CORPORATION
Phoenix New Jersey
A Division of Curtiss-Wright Corporation

"From the Great Lakes
to the Gulf—"

IT PAYS TO FLY



WRIGHT Aircraft ENGINES

Louis Francis Stoll 1889-1940



LOU STOLL IS GONE

When the early aviation men sold of his passing they spoke of Louis F. Stoll, vice president and director of the McGraw-Hill Publishing Co., but to those of us who knew and worked with him, he is simply Lou Stoll. He always will be. For in his life no tragedy of fortune ever could strike the brave qualities of the man, even the danger of death itself never will strike our memory of them.

Lou Stoll was the living answer to those who think that business success can be achieved only by sacrifice of the human qualities that inspire the affection of others. He showed that integrity and our own consciences, that realism need not mean cynicism, that self-interest need not imply ruthlessness. He knew how to handle business with the best of both worlds. He was able to make the most of himself without exploiting others.

And Lou was successful. He came up the hard way. In his first field of work—automotive publishing—he was a pioneer. He came from Kansas, was graduated from St. Mary's College there in 1909. Soon afterward he joined Chase Journal Co., then publisher of *Motor* and *Motor-Overland* and *Automotive Industries*. In 1923 he came in as McGraw-Hill.

From the first he commanded the respect and liking of his new associates. Soon he was given charge of the Transportation Group at McGraw-Hill papers, which then included *Electric Railway Journal* (now *Transportation Journal*) and *Rail Transportation*. In 1930 *Transportation* was added to these. In 1934 he was elected vice president and director of the company and in May 1939, he assumed the additional duty of directing the company's district office operations.

But all this is no more than a roll of jobs and titles. It does not tell us all of Lou Stoll and why he will be so sorely missed by so all, especially by those who have been privileged to work close to him.

Every man who ever worked with Lou must be deeply conscious of a debt to him. For it was his good fortune to command the profound respect of the executive, he knew how to check itself he helped others to check with him. From his lips he heard nothing but honesty. In each of them he trusted but one loyalty—in the day's work. On them he relied but one effort—the best they could give to the job in hand.

Intelligent and successful himself, Lou Stoll knew how to direct small groups and stimulate unexcelled results in others. He was an editor-publisher, never asked the better of others for his own advantage. So no man who worked with Lou Stoll ever shrunk from giving him all he had. His men trusted Lou. And today those closest to him are wondering

what it is going to be like without the strength of his leadership, the encouragement of his counsel and the inspiration of his fast action for the day's work. They know they have lost something real.

But Lou Stoll will be missed beyond the needs of his immediate associates. For his leadership found scope in new broader fields than his own staff and his own company. In the councils of every industry that he served as publisher he was welcome as a valued contributor. The leaders of those industries know him well—they respect his understanding and trusted his judgment. No firm in there can be paid to a business publisher, Lou earned that tribute.

Stoll, Lou earned that tribute.

Scarcely sound to his capacity for leadership was his unusual talent as a conversationalist. He knew how to build good will in his brief business. He knew his staff, that gave without saying. And he could be thoroughly work on assumption, aggressive without arrogance, friendly without leniency.

And when Lou went out to still he always appeared without his slight hump in a suit of the boy's goodness. He talked the boy's language, about his thoughts, was conversant of his viewpoint. Today even those who have known him since the first week when he has done business in relation with him. For no one knows the real Lou Stoll. He was rugged and trusted him. And he was known that he has lost something very real.

So we are grieved to Lou for leaving us the great deal business and friendship are not things apart, that success does not preclude a direct consideration for others, that strength and gentleness are not alien to each other. For in all these he excelled. And the memory of his excellence will abide with us always.

His goodbye, Lou! The last few months, we know, have been tough going. And as we reached from the shore, we have returned to see you standing in publicly these broken waters just off the beach. But now you're clear. And I seem to see you as I left you last time we were together on your "Blue Water". You stood on deck, relaxing in a chair as you worked problem to me. And now you're clear, headed into the water and the coast.

We're going to miss you, Lou—far more than words can tell.

James H. M. Crawford, Jr.

PRESIDENT, MCGRAW-HILL PUBLISHERS CO., INC.

RELY ON REPUBLIC!



REPUBLIC'S PURSUIT
AIRCRAFT FOR THE TOTAL
AIR FORCE OF 17,000

PEERLESS PURSUIT AIRCRAFT INSURE NATIONAL SECURITY against aerial bombardment and are a first essential to modern air defense. • Five Nations have equipped their air forces with our airplanes. • **REPUBLIC** advances in design and construction are continuing today on an accelerated scale to meet new demands for speed, stamina, range and performance.

REPUBLIC AVIATION CORPORATION

(FORMER NAME, REVERENT AIRCRAFT CORPORATION)

FARMINGDALE, NEW YORK, U. S. A.

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AVIATION
January 1941

26



Flashes

Picked Up Along Editorial Airways

✽ **ANYONE IS STILL A YOUNG MAN'S IDEALISM?** Even the old-timers are not so very old. And that is one of the reasons why we are so strongly shocked when death comes to one of our intimates. We were doubly

shocked in the case of Don Brown, because of his personal charm and his remarkable talents in manufacturing. The industry suffers a really great loss in having him taken from it at the early age of 49 and at a time when he was much needed. The last time we saw him was before his last illness. He was composed as usual and gave us last of his health.

The President of United Aircraft Corporation was the son of a Berlin, Wisconsin, iron cutter and began his career by mending papers for the *Chicago Evening Journal* at the age of seven. After graduation from high school he went to work in the local post office. His first manufacturing experience was building rural and home in his home town. But the world looked bigger than Berlin to him and when he attained majority he made his way to Chicago where he resided in the School of Commerce at Northwestern University and supported himself by employment in the Elmore Steel Company.

By this time the automotive industry was booming and Don went to work in the production department of the Simplex Automobile Company, which built Blaupunkt-Gnom airplane engines for the French Government

in 1915 and was recognized to become the Wright-Martin Aircraft Corporation in 1917.

After a brief sojourn he returned to aviation in 1921 as Assistant Factory Manager of the Wright Aeronautical Corporation and here he became closely associated with Frederick T. Rootcliffe, now Chairman of United Aircraft's Board. In 1926 they were among the founders of the Pratt & Whitney Aircraft Company in Hartford, and Brown was made factory manager. By 1929 he became a director and vice president in charge of manufacturing. In 1930 he was elected president.

Ranking still higher he was elected vice president and a director of the United Aircraft and Transport Corporation in 1932 and when it became the United Aircraft Corporation in 1934, he was elected president.

The nylon colored Pratt & Whitney engine factory, now covering more than a million square feet, 580,000 Knottsville Farm, the busy Housatonic-Standard People's factory and the newly-erected Virginia-Albemarle plant at Knoxville, Tenn., are among the many monuments to Donald Landon Brown. He was also a Governor and Member of the Executive Committee of the Aeronautical Chamber of Commerce, a member of the Institute of the Aeronautical Sciences, and a director of several Hartford business institutions.

Among his many tributes from at-

tributes Government officials, and men in high places at our national divisions, was one from President Guy Vaughan of the Curtiss-Wright Corporation. It follows:

"The passing of Donald L. Brown, the president of United Aircraft Corporation, is an irreparable loss to the industry and a great sorrow to all of his friends. As a pioneer of aviation, his contributions have probably been greater than that of any other man of his age. The rapid and efficient development of United Aircraft stands as a monument to his work."



Donald Landon Brown

AVIATION
January, 1941

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THE INTERCONTINENT CORPORATION

*Leading Exporters of
American Aeronautical Products*

30 ROCKEFELLER PLAZA
NEW YORK CITY, U. S. A.

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To AVIATION's Readers

With this issue the number of your magazine increases considerably. Hence, after some months of procrastination and planning to eliminate my earlier changes in policy or postponement, the editorial staff has been forced once in awhile to make an adjustment. In January 1948, therefore, in this issue will be found an account of the events and the status of my own development. But this is in no sense a "feature". My new duties will undoubtedly bring me new ideas and inspiration, and I do intend to take this opportunity, however, to thank you all for the support that you have given me thus far my years with AVIATION.

The magazine is passing into excellent hands. Lee Burdette has had many years of experience both in aviation and in publishing, and I confidently expect a great future for AVIATION under his able leadership. He is backed up by an editorial staff whose members have been selected for their competence in the many fields that aeronautical engineering must cover. We may look forward to a continuation of the service that AVIATION has given to the aviation industry and the aeronautical sciences all over the world during an invaluable and untiring period that is now within a year of the twenty-first year.

S. Paul Johnston

To our readers

Since the last issue of AVIATION we have had our publisher and changed our editorial staff. Our leading section was endorsed by the death of a brilliant publisher and a new blood, and it is still difficult to realize that Lee Burdette has been with us to help us over the rough spots with his long experience and initiative ability in aviation. His readers' needs. Many a future decision will be made on the basis of how Lee would have done it. But we must carry on and Lee's responsibilities will be carried off by George Platt, whom many of you have met who played his part in Lee Burdette's long career.

Paul Johnston has left us to take an important part with the National Aeronautics Committee for Aeronautics. A value addition of qualifications with regard to the performance of the duties of the Committee at Research. Paul's experience that has the public recently it would have been contrary to the board members of the industry for us to attempt to send in his way.

His departure leaves in my hands great responsibility of editorial direction of

the other American Aeronautical Magazine.

There will be no sudden changes in editorial policy, but our efforts will continue to be devoted toward aviation in general and growth AVIATION will continue to be published in the country.

In the future, our efforts and our plans always will be open to you, and your problems will always be our problems.

Recent editorial experience has created new problems in personal aviation products and equipment maintenance. The knowledge we have developed our staff by the addition of Carl Hermann, specialist in these fields and editor of many publications, including the book "Flying a Job in Aviation". Mr. Hermann has made a study of the maintenance issues of the motor oil lines and of numerous books.



Among the new features in this issue are AVIATION's Special Book of Design Detail (page 10), which contains complete information on the design of the airplane we describe and illustrates the construction design features by perspective and cut away sketches. Another innovation for us is the new many others in the General Aviation Specifications Table, which provides complete design specifications, dimensions, and performance for all American airplanes in service production in any one year.

The editorial readers can also a new feature by Leonard Hocking, who examined last year's aviation in his field in the January issue.

You will find other changes in reading through this issue of AVIATION and there are many more to come. We hope you'll like them. But whether you do or do not please write to me and let us know because we cannot publish your comments without your permission.

John E. Burdette



Hocking found her address in Aviation Annual Directory issue

AVIATION
February 1948
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Airplane Products:

BRAKE WHEELS

High and Low Pressure "Streamline" Smooth Cores

TAIL WHEELS

Low Pressure "Streamline" For All Wheels

BRAKES

Mechanically and Hydraulically Operated

OPERATING CYLINDERS FOR HYDRAULIC BRAKES

TAIL WHEEL KNUCKLES

For "Streamline" Wheels, Swivelable and Swivelable with Shimmy Damper

PNEUMATIC SHOCK STRUTS

Designed and Tested to Meet Individual Requirements

PILOT SEATS

Standard Army and Navy Type

Expansive Information Available to those interested

BENDIX PRODUCTS DIVISION
OF BENDIS AVIATION CORPORATION - 100TH BEND, INDIANA

BENDIX

AIRPLANE WHEELS - BRAKES - PILOT SEATS - PNEUMATIC SHOCK STRUTS

AVIATION
Products, Inc.

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Side Slips

By
ROBERT OSBORN

THE two-engine monoplane made a long, low approach over the golf course toward a landing on the old Curtis Field on Long Island. Presently the pilot saw that he had misjudged his glide, and that a heavy loss the engine would be necessary to get the ship onto the field. He reached over and shoved both throttles forward. One engine coughed but the other spluttered and coughed, and the ship suddenly slowed around, dropping one wing back of a leader. The airplane over-balanced, tipping off both wings and landing gear ready, and leveling only the landing skids along its side. When the landing spread had more or less subsided, the pilot still back the side window, which was above him, shaded out, and then reached inside to help the stressed engineering observer who had been riding with him. "Come on, Park," he said, "we have to talk in five here."

The pilot was Paul Boyd, one of the most remarkable test pilots it has been my pleasure to know and work with. Always calm, and seemingly never disturbed by any happening, as matter how startling it might have been to an average person. Paul was once talking with another pilot, who had come in to land out on a runway before being delivery for an airplane. Unfortunately, it was the work which had been done the night before the airplane had been crashed in the process of taking and a good deal of time were spent as soon as the ship left the ground. When the ship was standing on its beam with about twenty feet in the air, ready for the complete walk-out which didn't even start anyone on board, Paul's only comment was "Oops! Here we go!"

Another time, Lloyd Child, new

famous for his co-head-on-side-on-house diving speed work, was riding with Paul as observer for the test of a single engine ship. Just as the ship came to the ground, headed for the corner of Curtis Field which was so beautifully landscaped with hedges, Open House Office, lunch wagon and high-classness was, the engine started making out. There was plenty of time to cut the gas and go back for another start but Paul calmly started taking the airplane in to see which one was the cause of the difficulty. As they staggered over the wires at the end of the field, Paul called over to Lloyd, "Make a note that the left wing needs some checking."

Paul was far less talkative than the average pilot, and when he made a report on his flight testing a new observation plane, he made to the Chief Engineer, the only proper authority, to his way of thinking: The Army, Navy, the Dept. of Commerce, the President of the Company, and the Project Engineer could get this information from the Chief Engineer if they wished, but not from Paul. Curtis Field pilots were many a time with someone's fault they couldn't get any information from Paul on any subject as all Captain Bender, of Marfield Field, told about the time he saw Paul coming out of the Air Corps weather office and couldn't even find out from him what the official weather prediction had been.

In between times in the Engineering School at the University of Minnesota, Paul had married a Jenny around the countryside, following the Pace circuit. One day a Patrol Marine airplane lost Paul and his ship as an added situation for his test show. In accordance with the agreement Paul landed outside the race track

and at a fair and the airplane proceeded to back its way, standing in the rear cockpit of the ship, while Paul, properly belted and gagged, served as the attraction at the front cockpit. Events went good for a while but the crowd grew astonishingly restless, demanding that a fight be made. Finally the Patrol Marine was released that the race had come for action instead of further action, as he was belted himself in the rear cockpit and said, "All right, my man. Make a fight!"

This was an unexpected turn of events for Paul, as he had shown the ship in light and had intended to take a rest that day. However, he considered the length of race profitable, the height of the crowd fierce, and the added one hundred and twenty pound weight in the rear cockpit, and decided he could make it. He did make the race all right, but the day was hot and the jump was belatedly in the center of the field, as Jesus often were, and Paul flew several miles without being able to add altitude over the height of his first climb—the fence. Finally there was a continuous row of houses coming up, and the only solution to that problem Paul could work out was to stick the nose of his ship between two houses and let nature take its course. The wings were shored off easily and the landing moved down a gulch fence and sandy driveway between the houses, being hovering to a stop on the lawn of the house across the street. Paul collected his belt and started quickly in what he could do to help his passengers, but that advice perhaps was already standing up and had his head in his trousers pocket. "Get up, my man," he said. "What do I see?"

Paul was doing his testing in the ship when speeds were rapidly increasing with each new design, and "there" was just beginning to be the connection engineering grade. Very, very little was known about faster in these days—the only possible available was to fly a new design in it or it was impossible. One day the airplane Paul discovered a very serious fault—nothing and destructive. He knew was able to report to the company on that morning, but he came to Paul Boyd on that flight, as it was eventually to all of us whether we are first pilots or groundlings. However, knowing Paul's character, and honesty, and his code, no marriage in involved in saying that we were sure Paul made his report to the Proper Authority.

AVIATION
February 1935

29

LIGHT PLANE *Roundup*

THERE have been some movements in aviation before.

Our fellow countrymen have always been a dynamic people, pushing ever forward, subduing the powers of the middle states, the great plains of the southwest and finally conquering the rich frontiers of the West Coast. Although we have been on the go for generations, there never has been such a mass movement of wings as took place recently in the flying paradise of Florida.

So, hordes of airplanes soaring into Miami are a symbol of the light plane boom of today—the greatest boom of privately owned airplanes in the history of aviation. Some 3,500 of these ships were built last year, approximately doubling production for the preceding year. The light plane industry has definitely come of age.

The public's interest in flying is

nothing new. It has been in the blood for a long time. But, in the past, interest could not mean ownership because both flying lessons and airplanes cost too much for the average person. Now, however, interest is being translated into action. The public is learning to fly—and is buying planes to fly in.

So the airplanes had to come first. You can't have a flying lesson without the right ships. Light planes of today are delivering a brilliant performance for comparing that of a few years ago. Prices are low, safety is high. Modern airplanes are rugged, sturdy, dependable machines designed to afford to take you places in a hurry.

These are no longer merely "hangar" planes. You are not confined to flying about your own back yard when airplanes will take you many miles cross-country in a day. You know your engine can be depended upon when a stock market will put "credit" in the air as the more than one makes. You know that steady performance is built into these light planes when they have been flown cross-country non-stop. Operating expense is not a worry when your ship consistently gets you 25 miles to a gallon of gas.

But the best proof that these light planes can take it lies in the results achieved by the Florida contest. That was something!



Summer weather, such as this in Palm Beach, was the goal of some 600 pilots who flew to Florida in the recent Contender.

Strut down for the night at Kissimmee, Florida, after a busy day of flying.



Just recently there were more on many wheels and flying weather that they proved both pilots and ships had plenty of chances.

Specimens along the main rail had their eyes in common at the border of planes parked down in the field.

For forecasts of the immediate future we turn to the heads of the line leading manufacturers of light airplanes. They are uniformly optimistic. According to the light plane business it is no longer so much a matter of *if* it is with us to stay.

Here they are! We pay our tribute to the men who have made the light plane possible—the designers—the builders—the engine and accessory manufacturers—and the men who make the sales!

1,800 Cubes a Record

By W. T. Piper

*President
Piper Aircraft Corporation*

ABOUT 1808 Cubs rolled out of our Lockhaven plant in 1958. That's a lot of airplanes when you figure that it takes as many as 100 the time to build a plane ship produced in our mother country as readily as 1955.

Our latest order was for 73 Trainers with a 58 h.p. engine. This would, with other 50 h.p. types, make up about three-quarters of our total production. The balance was Cub Cougars with more powerful engines.

During 1958 school operators were our largest customers, taking about 85 per cent of our airplanes. That



W. T. Piper

year we again expect the bulk of our output will go to the operators. And we believe that in 1961, sales to private owners will increase so that they will take half our ships.

The Piper sales organization is based on the distributor-dealer plan. This gives us a well-qualified man in each district. We try to give occasional conferences to our distributors and expect them, in turn, to cooperate with the dealer.

For 1960 we have announced better prices for less money—with better designing and better engines. In addition to our well-known models we have the new first place Cub Cougar, four others we expect this thing. Through greater use of tools, jigs and dies we have improved factory methods to produce our ships more economically—and our buyers get the benefit.

Although we have been fortunate enough to lead the field in volume of sales, we know that only a few airplanes have been sold compared with the vast potential market of the next few years.

New Trainer—New Plant

By Carl Fiedler

*President
Aeronautical Corporation of America*

AERONCA built and sold more than 600 airplanes last year, which is about double our production figure for 1958. We expect a 50 per cent increase this year.

Private owners and dealers still took about one-third of our output, with flying schools buying about 35 per cent. Company estimates about 30 per cent and the rest going to flying clubs. Whereas one-third of our ships in 1958 were equipped with 40 h.p. engines, and the balance with those of 30 h.p., in 1959 only 19 of our airplanes had 40 h.p. engines, 259 had 30 h.p. equipment, and 365 were provided with engines of 65 h.p.

The Aeronca distribution system is set up as a direct salesman, distributor and dealer basis. The chief advantage of the system is that these people are operators and the average person who buys an airplane needs the kind recommended by someone



Carl Fiedler

experienced in aviation. As the airplane is the place where the ship is demonstrated, we prefer to deal through successful operators.

This year we are introducing a new model—a 80 h.p. tandem-type trainer. The new ship is designed to meet an untapped market. It should open up to our dealers and distributors a new field and provide stimulus for increased sales. Our engineers are working to decrease production costs without sacrificing any of the fine features built into Aeronca ships.

Production facilities were added last year. We plan to expand them in 1960 by building a new factory and office building in Middleburg, Ohio, where we will have approximately 60,000 square feet, including an experimental shop and a storage hangar. In the past our greatest source in cutting production costs has been through the modification of machinery to replace hand operations. This policy is to continue in our new plant.

The industry is making continual progress. In the near future our present production records will be something to smile over.

Factory Still Growing

By C. G. Taylor

*President,
Taylorcraft Aircraft Corporation*

AS I look back on the year 1959 I realize that the major problem of our company was one of developing more understanding among our representatives. Good salesmen in the aircraft field are scarce. While our ships are usually superior in cost, a good airplane will not sell itself. Skilled salesmen are also needed.

Our criticism is a defense here in the sales forces as they build up the sales of the airplane and take it out of the plant sales. We have always looked for hours and whenever possible have proved them wrong.

Last year approximately 65 Taylorcrafts were sold. About 250 were 30 h.p. ships and the balance were of 65 h.p. We sell about 60 to 70 per cent of our airplanes are purchased on time payments, the bulk of these going to private owners.

Our production facilities are inadequate and we anticipate expanding them for 1960. We now have about 22,000 square feet of floor space. This expands on and we have been working our shop shop two shifts. We have been putting out the most airplanes per square foot of factory space of any light plane company. To start a company and develop it brings



C. G. Taylor

plenty of problems, and our combined efforts have been almost exclusively to solve them and to cut production costs and achieve better results.

Our sales system is on a distributor-dealer basis. This has worked well with the major exception that some distributors have been down that are too large for them to handle efficiently. We also find that some firms are poor sellers for "discount" territory. Trade areas have better boundaries.

In 1960 we estimate that we will produce more than 500 ships—the bulk of these being of 65 h.p.

Winter Production Up

By J. H. Thomas

*President
Lancaster Aircraft Corporation*

PERSPECTS for the light, all-weather airplane are decidedly good for 1960. Last year we sold 285 airplanes—but in 1960 we should sell at least 340. About 80 per cent of our output is equipped with 44 h.p. engines, the balance with those of 30 h.p. There are now about 175 schools using Lancasters for instruction purposes and this accounts for approximately one-half of our 1959 sales. In 1960, however, we anticipate that 80 per cent of our ships will go to private owners.

One reason for our optimism is that winter sales are holding up exceedingly well. In December, when sales of light airplanes usually fall off, we received as many orders as during our most active summer months.

Last year we put up a new building which increased our floor space to 15,000 square feet. This enables us to build two airplanes per day. Our production runs are as consistently staying the establishing of making parts have instead of farming them

out, and in this we have recently added a large supply of new equipment. A new graphic control system has given us a better check on production. We have also checked our factory and used modern tools so that their work comes through in uniform speed. The Lancaster was designed with future production problems in mind. The one stumbling block it takes to simplify our design so that production is largely a matter of stamping and assembly.



J. H. Thomas

Lancaster distributors are airplane men and have adequate capital to handle inventory, and to advertise and merchandise our airplanes properly. Moreover, demand is not given until the sale of these ships within a specified time limit. Therefore, we are assured until a distributor proves his ability to produce sales in keeping with the probability of the territory. This year we plan to use a more pronounced sales contract by factory or territorial salesman.

We find also that the light plane business is only absorbing the surplus of its production. We believe that the public is now beginning to take private flying seriously and we expect that in two years the light plane market will be more than 75 per cent above what it is today.

Big Six Months

By W. A. Moore

*President
Boeing Aircraft*

WITH the introduction of its 306 last June, Boeing entered a new phase in its production history. The new plane received a warm and enthusiastic response throughout the country



W. A. Moore

While a few more deliveries in June, we did not really get into production until July. By the end of December we had sold 260, which, we feel, is a good showing for a brand new ship. About one-third of the 260s were delivered to distributors and dealers, a number of the latter being operators as well. The rest went to individual owners.

The company will through distributors, which we support. The distributor is now appointing his own dealer. We have shown inventories and we also have regional sales managers, employed by the factory whose job is to support the distributor and work with him to increase sales through proper methods of education and promotion. Outside of general advertising, and possibly some national advertising, our promotional attention will run to a more intensive making of each particular territory and the use of direct mail.

Our new Starliner plant will permit us to triple our production facilities during 1960. To leave out even so our manufacturing of parts we have completely loaded the 115. For this building we need approximately \$100,000 in new machine tools of various kinds. Part of last year we employed three shifts in the factory but we want to avoid that again if possible. The experience proved that the second shift was not as efficient as the first day shift, and that the third was least efficient of all.

Our buying of new materials is based on selling at least 800 of the 306 would this year. By providing better airplanes at prices that are not too great a number of people can pay the aviation industry is definitely moving towards a time when the light plane business will assume great importance.

HERE'S WHERE

WE'RE GOING

Greatest Year for

Civil Aircraft Production

Although producers of American military aircraft have been given the center of the aviation stage, manufacturers of civil airplanes are also driving ahead to achieve a new high in production. Unlike Europe, where there has been almost no private flying for over a year, growth in this country in both civil planes and their operation has been the greatest in history.

Civilian Pilots

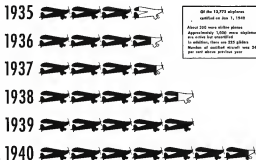
Are Taking to the Air

Number of pilots has been growing steadily in recent years, reaching a peak on Jan. 1, 1940 which was 27 per cent above figure for the preceding year. With the helping hand of the C. A. A. flight training program, new pilots receiving certificates this year should number between 12,000 and 20,000. Growth should be rapid for several years.

VOLUME OF CERTIFIED AIRCRAFT INCREASES STEADILY

Each figure represents 3,000 certified airplanes

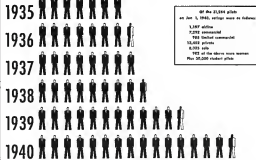
Jan. 1



TO OPERATE OUR CIVIL AIRPLANES, WE HAVE A GROWING FORCE OF PILOTS

Each figure represents 2,000 certified pilots

Jan. 1



American

PLANES and ENGINES

for
1940

IN THIS **FORUM** of great activity in all branches of the industry there is a time to pause for a display of wares. Few of us have taken time out even to think about a general air show this winter. Nearest approach was the recent Air Corps exhibit in Washington which was an excellent display of military equipment but necessarily lacked representation of the civil aircraft manufacturers.

With these ideas in mind we have attempted to make our **Annual Directory** less more than ever a show in print. In it are concentrated complete specifications of all civil and military aircraft in current production. This presentation is in a new tabular form and is packed into a few pages so that it will be unnecessary to seek out data from page after page of material. For those who are interested in photographs and three-view drawings, a pictorial section with abbreviated specifications is provided on the pages immediately following. Instead of the usual pictorial treatment for engines we are showing most of them in cutaways offering an opportunity to study the details of their construction. Our alphabetical directory section has been increased to include key personnel of aircraft, engine, accessory, and material manufacturers.

A new department has been added for the benefit of those of us who are interested in detailed design features of aircraft and wish to study them in perspective. We will credit with interest your comments on **AVIATION'S** Sketch Book of Design Detail.

Although this issue is devoted primarily to the peace time pursuits of aviation people, we have not hesitated to include a pictorial section on military aircraft in addition to the complete specifications.

We hope you will like it.

AIRCRAFT of 1 to 3 SEATS

For complete specifications see page 63



Aeromac 50-F

A.T.C. 118

THE **AEROMAC 50-F**, 50-L or 50-LA two seater is powered with a **Pratt & Whitney (50-F)** or **Lycoming** engine rated at 80 h.p. It has a top speed of 70 m.p.h., and cruising speed



Aeromac 50-C, 65-C

A.T.C. 119

THE **AEROMAC 50-C** or **65-C** is a two-place closed monoplane powered by a **Continental** or **Lycoming 65** h.p. engine. It has a top speed of 140 to 148 m.p.h., cruise at



Axson Puck Model B

A.T.C. 111

Axson offers the **Puck Model B** at \$1,540. It is powered with the four cylinder in-line, inverted, 65 h.p. liquid cooled **Puck** engine. The ship is fabric covered, open and

skin are of wood, and the fuselage is of welded steel tube construction. The **Puck Model B** has the following performance: high speed, 112 m.p.h.; cruising speed, 100 m.p.h.; climb, 750 ft. per min.; service ceiling, 14,000 ft.; fuel capacity, 18 gals.; range, 400 miles; weight empty, 475 lb.; gross, 1514 lb.





Applegate Amphibian

No. A.T.C.

THE APPLEGATE AMPHIBIAN seats two, has a 75 hp. Continental motor of pusher type, mounted along the wing. Construction combines fabric covered wings with hull of

aluminum alloy, and landing gear of retractable type. High speed is 142 m.p.h.; cruising speed, 45 m.p.h. Service ceiling is 15,000 ft.; forward range, 500 miles; climb, 400 ft. per min.; span is 34 ft. 6 in.; length, 26 ft.; height, 8 ft. Sells for \$10,500 at factory.



Bellanca Crusader 14-9

No. A.T.C.

THE BELLANCA CRUSADER Model 14-9 is a 2-seat monoplane, seating a 90 hp. LeBlond engine, with retractable landing gear. Two vertical fins are mounted at the ends of

the stabilizer. Maximum speed is 155 m.p.h., cruising 128 m.p.h. Service ceiling is 15,000 ft., with a climb of 750 ft. per min.; and range of 400 miles. Dimensions: wing span, 34 ft. 2 in.; length, 31 ft. 2 in.; height, 8 ft. 3 in. Landing price is \$4,750 factory at factory. Equipment items extra.



Fairchild M-42

No. A.T.C.

THE FAIRCHILD M-42 is a primary trainer and also bears A.P. Corps designation, PT-23. This two-place craft has a 75 hp. Ranger motor, fixed landing gear, spars of solid

spruce, ribs of aluminum alloy, plywood-covered wings and a welded steel and fabric hull. Top speed is 140 m.p.h., cruising speed 120 m.p.h. Forward range is 550 miles, service ceiling 14,000 ft. Climb at sea level is 450 ft. per min.; span, 26 ft.; length, 27 ft. 9 in.; height, 7 ft. 2 in.



Abrams Explorer

No. A.T.C.

ABRAMS EXPLORER Model PC-4 has a Wright 400 h.p. engine. Range, 2,150 mi.; climb, 1,500 ft. per min.; service ceiling, 20,000 ft.; speed, 26 ft. 4 in.



American Aircraft S-1B

No. A.T.C.

THE AMERICAN AIRCRAFT S-1B (Security Aircraft) Forward by a Security 125 h.p., six place craft has a speed of 150 m.p.h. top speed, and 130 m.p.h. cruising.



Kellett KD-1

A.T.C. 702

KELLETT offers a single seat model, KD-1B (three-view of which is shown), and a two-place model, KD-1, (a photograph of which is shown.) The KD-1B is familiar as the



Luscombe Model 8A

A.T.C. 691

LUSCOMBE'S Model 8 and Model 8A are powered by Continental, the former with 80 and the latter with 65 hp. Model 8A is also available as a monoplane. Performance of



Monocoupe 90-A

A.T.C. 904

THE MONOCOUCHE 90-A is similar offered at a price of \$2,075. Power is supplied by a 90 h.p. Lambert engine. Performance figures follow: High speed, 158 m.p.h.; cruising

speed, 130 m.p.h.; stalling speed, 40 m.p.h.; climb, 500 ft. per min.; service ceiling, 15,000 ft.; range, 600 miles; weight empty, 667 lb.; gross weight, 950 lb.; dimensions: span, 32 ft.; length, 30 ft. 4 in.; height, 6 ft. 11 in. Fuselage is welded steel tube, fabric covered.



Collier C-1

No. A.T.C.

COLLIER AIRCRAFTS, C-1-A, two-placer, is offered with a Hercules of 125 hp. High speed, 135 m.p.h. at 10,000 ft., cruising 125 m.p.h. at 10,000 ft.; climb, 800 ft. per min.



Collier D-1

No. A.T.C.

COLLIER D-1 Model D is two-place powered by 75 hp. Continental. Retractable landing gear. Cruising speed, 115 m.p.h. Price will be approximately \$2,500.



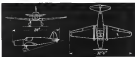


Phillips 1-B

A.T.C. 440

THE PHILLIPS 1-B biplane has a 125 h.p. Menasco motor. It has a range of 750 miles, and has a service ceiling of 15,000 ft. Top speed 140 m.p.h., cruising 130 m.p.h.

Climb is 100 feet per minute. Spars, ribs and wing-covering are of aluminum alloy—half is of stiff steel. Span is 30 ft. 8 in.; length is 24 ft.; height 7 ft. 6 in. It sells for \$4,500 at factory.



Piper Cub Coupe J-4

A.S.G. 301

THE PIPER CUB COUPE J-4, 2-place plane has a Lycoming 6-16 at 85 h.p. Continental A-75 50 h.p. motor, has a high speed of 160 m.p.h., cruising 87 m.p.h. Normal

range 510 miles, service ceiling 12,000 ft., climb 600-650 feet per minute. Span 30 ft. 2 in., length 22 ft. 5 in., height 6 ft. 10 in. Spars are of solid spruce, ribs of aluminum alloy. Half is of welded steel and fabric. The plane sells for \$4,950 to \$5,100 at factory.



Piper Cub Cruiser J-3

IN A.T.C.

THE PIPER CUB CRUISER J-3 biplane has a Continental A-75 50 h.p. motor. Service ceiling is 15,000 feet; normal range is 500 miles. It does a top speed of 150 m.p.h. and

cruises at 87 m.p.h. Climb is 400 feet per minute. Spars of solid spruce, ribs of aluminum alloy, wings fabric-covered. Half is of welded steel and fabric. Fixed landing gear, with fuel wheel. Span 30 ft. 8 in.; length 22 ft. 4 in.; height 8 ft. 10 in. Sells for \$5,750 at factory.



Ercoupe 415

IN A.T.C.

THE EROUPE & ROBECHT CORPORATION'S Ercoupe 415 is a two-place craft powered with a 50 h.p. Ercoupe motor, designed for top speed of 160 m.p.h., cruising, 76 m.p.h.

MILLER 2-1 IN A.T.C.
TWO-PLACE MILLER 2-1 performance: top speed, 120 m.p.h.; cruising, 710 m.p.h.; climb, 150 ft. per sec.; service ceiling, 16,000 ft.; range, 100 mi.



Porterfield 50

A.S.G. 305

THE PORTERFIELD 50 is a 2-place plane with a Continental 50 h.p. motor. It is scheduled to do 125 m.p.h. high speed and 90 m.p.h. cruising. Normal range is 500 miles, service



Porterfield 145

A.S.G. 311

THE PORTERFIELD 145 biplane also has a 50 h.p. Warner motor, and will do 135 m.p.h. top speed, 120 m.p.h. at cruising. Service ceiling, 20,000 ft., normal range, 550 mi.



Porterfield 145

IN A.T.C.

THE PORTERFIELD 145 is a 2-place craft powered by a 50 h.p. Warner motor. The speed 135 m.p.h., cruising 112 m.p.h. Service ceiling 20,000 ft., normal range 550 mi.



Bearwin Cloudster, 8125

A.T.C. 715

THE BEARWIN CLOUDSTER, Model 8125, is a two-place steel monoplane powered by a 40 h.p. Ercoupe 120 h.p. motor. It sells for \$4,500. The fuselage is of welded steel and

construction, fabric covered. Wings have wood spars and ribs and are also fabric covered. Performance figures follow: high speed, 145 m.p.h. at 400 ft.; cruising speed, 118 m.p.h. at 500 ft.; climb, 2000 ft. per min.; service ceiling, 17,000 ft.; range 450 miles.



Bearwin 6000M

A.T.C. 301

BEARWIN CLOUDSTER, 6000, 6000M, is available as a monoplane. Warner, Ercoupe 50 h.p. motor. Top speed, 125-130 m.p.h. at 400 ft.; climb, 115-118 m.p.h. at 400 ft.

BEARWIN 6000M IN A.T.C.
BEARWIN CLOUDSTER, 6000M, \$4,495, 2-place, Monoplane 120 h.p. High speed, 145 m.p.h. at 400 ft.; cruising, 118 m.p.h. at 500 ft.; climb, 1200 ft. per min.; range, 715 miles.





Ryan Model S-C

A2C 100

THE RYAN S-C is a three-place closed low-wing monoplane. Fuselage is of aluminum construction. Wings are fabric covered with metal spars and ribs. Power is by a 145 hp.

Warner engine. Top speed at sea level is 150 m.p.h.; cruising speed is 130 m.p.h. at 8500 ft.; climb, 500 ft. per min.; service ceiling, 17,000 ft.; range, 300 miles; fuel capacity, 37 gals.; stalling speed, 45 m.p.h.; weight empty, 1240 lb.; gross weight, 2100 lb.



Ryan Model ST-A

A2C 111

THE RYAN ST-A, two-place, low-wing Monoplane is adorned with the Monocoque 225 hp engine. It is also available as the ST-A Special with a Monocoque having 190 hp.

or 200 H. Performance follows for ST-A and ST-A Special: high speed, 150 m.p.h. (140 m.p.h. at 2000 ft.); cruising speed, 135 at 8000 ft. (120 at 8000 ft.); climb, 600 ft. per min. (575 ft. per min.); service ceiling, 18,000 ft. (16,000 ft.); stalling speed, 42 m.p.h. (40 m.p.h.); range, 265 miles (225).



Poped Skylark W-1

No A2C

THE POPE SKYLARK W-1 is a 3 place craft with a 120 hp Warner motor. Its range is 545 miles, top speed 110 m.p.h., climbing 117 m.p.h., service ceiling 16,000 ft.

Phillips CT-1 No A2C
THE PHILLIPS CT-1 is a two-place biplane. Its 100 hp Phillips motor is capable of a high speed of 120 m.p.h., cruising 110 m.p.h. Service ceiling is 10,000 ft.



Stearman-Hammond T-15

ATC 24

THE STEARMAN-HAMMOND T-15 is 2-place, powered by Monoco 150 h.p. Side for \$7,150. Top speed, 125 m.p.h. at 8000 ft.; cruising, 112 m.p.h. at 2000 ft.

White PT-7 No A2C
WHITE AIRCRAFT PT-7 is a 2-place open biplane with a 100 h.p. Warner engine. Top speed, 130 m.p.h.; cruising, 65 m.p.h.; climb, 1000, gross weight, 2240 lb.



Stinson 105

No A2C

Stinson's new three-place Model 105 is equipped with the Continental 75 h.p. or 85 h.p. (1910 model) engine. Performance follows: 75 hp. (80 hp) cruising speed, 187.5

m.p.h. at 4500 ft. (111 m.p.h. at 4000 ft.); climb, 400 ft. per min. (460 ft. per min.); service ceiling, 9,000 ft. (12,100 ft.); range, 450 mi. (480 mi.); fuel capacity, 30 gals. (28 gals.); weight empty, 1800 lb. (2000 lb.); gross weight, 2500 lb. (2600 lb.). Stalling speed is 45 m.p.h. in both cases.



Taylorcraft BC-45

ATC 100

THE TAYLORCRAFT biplane Model BC-45, BC-45 is powered by the 40 h.p. Loening or Continental engine. It is priced at \$1,775 to \$1,425 and is also available as a

monoplane. Top speed is 104 m.p.h., cruising speed, 85 m.p.h.; stalling speed, 35 m.p.h.; climb, 500 ft. per min.; service ceiling, 10,000 ft.; fuel capacity, 12 gals.; fuel consumption at cruising speed, 27.5 gals. per hr.; range, 350 miles; weight empty, 950 lb.; gross weight, 1350 lb.



Taylorcraft BL-7

ATC 100

TAYLORCRAFT's Model BL-7 Trainer is equipped with either a Loening, Franklin, Continental, 60 hp. engine. It is two-place, available as a monoplane. Construction is

conventional welded steel tube fuselage. Wings have wood spars, metal ribs, and are fabric covered. High speed, 97 m.p.h.; cruising speed, 64 m.p.h.; stalling speed, 36 m.p.h.; climb, 400 ft. per min.; service ceiling, 13,000 ft.; range, 220 miles; weight empty, 910 lb.; gross weight, 1310 lb.

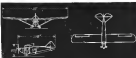


Welch OW

ATC 100 100

THE WELCH AIRCRAFT BOWLING, Model OW, is a two place closed monoplane available with a choice of the following engines: Continental 40 h.p., Hercules 60 h.p.,

Wich, 60, 40 hp., and Franklin 66 hp. Performance falls between the following limits depending on the power: high speed, 93-120 m.p.h.; cruising speed, 55-65 m.p.h.; stalling speed, 35-50 m.p.h.; climb, 450-550 ft. per min.; service ceiling, 11,000-14,000 ft.; range, 340-500 mi.



AIRCRAFT of 4 and 5 SEATS

For complete specifications see page 71



Beech D-17A

A.T.C. 111

Beech's well known four-place biplane appears in the models powered by Jacobs, Pratt & Whitney, or Wright engines ranging from 115 to 150 h.p. Performance varies,

depending on the power as follows: high speeds from 175 to 221 m.p.h. at 5 ft., cruising speeds from 171 to 194 m.p.h. at 5000 ft.; climb from 500 to 3400 ft. per min.; service ceiling, 21,000 to 24,000 ft.; range, 725 to 828 mi.; gross weights from 3280 to 4260 lb.



Cessna C-145

A.T.C. 101

Cessna's four-place monoplane, C-145, is powered by a Warner 145 h.p. engine. Cessna also has in production a similar ship powered with the Warner 165 h.p. engine.

and is the Model C-155. Performance of Model C-155: top speed, 242 m.p.h.; cruising, 181 m.p.h.; climb, 1800 ft. per min.; service ceiling, 14,000 ft.; range, 818 mi.; weight empty, 1560 lb.; gross weight, 3550 lb. C-155: top speed, 246 m.p.h.; cruising, 187 m.p.h.; climb, 2125 ft. per min.; weight empty, 1600 lb.; gross, 3550 lb.



Cessna T-30

No A.T.C.

Cessna's newest is the two-engine Model T-30. It is a five-place ship, is powered by two 105 h.p. Jacobs engines and has a retractable landing gear. Fuel tank is of welded

steel tank construction, fuselage covered. The ship has a high speed of 248 m.p.h. at 8 ft., cruise at 181 m.p.h. at 1500 ft.; climb, 1825 ft. per min.; has a service ceiling of 23,000 ft.; a range of 743 miles; weight empty, 3500 lb.; gross weight, 3800 lb.



Fairchild F-24

A.T.C. 117

The Fairchild four-place F-24 W-40 is available as a landplane or seaplane powered by the Warner 145 h.p. engine. The price is \$2,015. Performance is as follows:

high speed, 185 m.p.h.; cruising, 122 m.p.h. at 7000 ft.; climb, 120 ft. per min.; service ceiling, 25,700 ft.; range, 720 miles; fuel capacity, 40 gallons; weight empty, 1402 lb.; gross weight, 3048 lb.; speed, 90 ft. 4 in.; length, 32 ft. 9 in.



Fleetwings, Inc.

A.T.C. 105

Fourwings 260, even offers its seaplane with a 230 h.p. Jacobs engine. Except for the wing covering which is fabric, the ship is built entirely of welded aluminum.

steel. The following performance figures are given: High speed, 185 m.p.h.; cruising speed, 120 m.p.h.; service ceiling, 14,000 ft.; range, 818 mi.; weight empty, 1644 lb.; gross weight, 3756 lb. This model is also available with two piston propeller giving increased performance.



Howard DGA-15

No A.T.C.

The Howard Seaplane DGA-15 is designed along typical Howard lines and is equipped with a Pratt & Whitney Wasp, Jr., of 100 h.p. at 8000 feet. It is capable of a top

speed at sea level of 234 m.p.h.; cruise at 250 m.p.h. at 6000 ft.; climb 1945 ft. per min.; has a service ceiling of 21,000 ft.; a range of 565 miles; a weight empty of 2125 lb.; gross weight, 4035 lb. Model DGA-15 is available on order, and suitable as photographic, ambulance, or cargo plane.

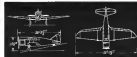


Spartan Executive 7W

A.T.C. 113

The SPARTAN AIRCRAFT COMPANY'S all-metal, Executive 7W is equipped with a retractable landing gear and is powered by a Pratt & Whitney Wasp, Jr., of 400 h.p.

The high speed of this ship is 235 m.p.h. at 6000 ft.; cruising speed is 206 m.p.h. at 1400 ft.; climb, 1800 ft. per min.; the service ceiling is 23,000 ft.; range is 598 miles; the weight empty is 2295 lb.; while the gross weight is 4600 lb. Fuel capacity is 712 gallons.





Stinson SR-10

A.T.C. 111, 113, 114

The **FORLAN 4-6** plane **Stinson SR-10** is offered in also models, five of which are available also as complete. These models are powered with **Lycoming, Pratt & Whitney**.

tor, or Wright engines of from 225 to 450 h.p. with the following performance range: cruising speed, 147 m.p.h. at 6000 ft. to 175 m.p.h. at 14000 ft.; climb, 518 ft. per min. to 1400 ft. per min.; service ceiling, 17,500 ft. to 21,000 ft.; weight range, 3315-3545 lb., gross, 3475-4250 lb.



Waco X

to A.T.C.

Waco's Model X comes with Jacobs, Pratt & Whitney, or Wright engines of 300 to 450 h.p. Good is integral part of ship. Also standard wing.

Waco X

A.T.C. 117

Waco Model X has tricycle landing gear, 500 h.p. Jacobs engine. Price is \$12,500. Free plane, engine, 161 m.p.h. at 8100 ft., range, 335 mi.



Waco 5

A.T.C. 121, 122

The Waco Model 5 is equipped with Jacobs or Continental engines of from 225 to 355 h.p. It is priced from \$7,500 to \$7,550. Performance falls between the following limits:

low high speed, 141 to 185 m.p.h.; endurance, 150 to 240 m.p.h. at 10,000 ft., climb, 715 to 450 ft. per min.; service ceiling, 14,150 to 14,000 ft.; range, 450 to 810 mi.; fuel capacity 50 gals.; weight empty, 3000 to 3845 lb.; gross weight, (in all cases) 3925 lb.



Fairchild F-24, B-40

to A.T.C.

Fairchild's 4-engine F-24 B-40 with Ranger 175 h.p. engine, available either as biplane or complete. Price \$7,235. Range, 400 miles on 40 gal.

Org M-32

to A.T.C.

The Org four-plane M-32 is powered by **Vietor and Mustang** engines from 245 to 175 h.p. Price with Warner 145 h.p. \$6,450. Speed 50 ft. per min.



Barkley-Grow TGP-1

A.T.C. 121

The **Barkley-Grow TGP-1** is a two-engine, low wing transport powered by two Pratt & Whitney engines of 108 h.p. This ship is available also as biplane or triplane.



capacity is 140 gallons which gives a range of 750 miles. Other performance figures are as follows: high speed, 200 m.p.h. at 8000 ft., cruising speed, 175 m.p.h. at 14000 ft.; climb, 518 ft. per min.; service ceiling, 17,500 ft.; weight empty, 3445 lb., gross, 4250 lb.



Beech 18-5

A.T.C. 111

This two-engine Beech Model 18 is offered in one 2-8 plane model, the 185, and two 4-6 plane models, the 18A and 18D. They are powered by Pratt & Whitney, Wright, and



Jacobs respectively. Total power ranges from 640 to the 14A to 500 h.p. in the 185. Performance are as follows: top speed, 204.150 at 5,111; cruising, 204.500 at 10,000; 19,000 ft.; climb, 1,500-1,800 ft. per min.; service ceiling, 17,000-21,000 ft.; and gross weights from 7200 to 11,000 lb.



Bellanca Aircruiser Cargo

A.T.C. 121

Bellanca's **AIRCROISER CARGO** is a four plane model engine ship with 715 h.p. Wright Cyclone. Cruising, 158 m.p.h. at 12,000 ft., wgt. empty, 4117 lb.; gross, 11,400 lb.

Air Transport T-6

A.T.C. 111

As **TRANSPORT Ship Company's T-6** is six plane with three 100 h.p. **Continental**. Cruising speed, 125 m.p.h. at 1000 ft.; climb, 150 ft. per min.; range, 450 miles.



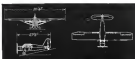


Bellanca Pacemaker

A7C 118

PACEMAKER by BELLANCA is a standard airplane powered by a 400 h.p. Wright Whirlwind. This is one of the most famous of the Bellanca models and has long since

proved its ability by many endurance and long distance flights. Performance: high speed, 260 m.p.h.; cruising, 140 m.p.h.; climb, 700 ft. per min.; service ceiling, 12,000 ft.; range, 500 miles; weight empty, 2050 lb.; gross weight, 2800 lb.



Boeing 307

IN A7C

Boeing's Model 307, better known as the Steamroller, will keep to the schedule a 30 seat, four engine transport with a supercharged engine for high altitude flying. Engine 12,000

foot pressure will be maintained in the cabin at an altitude of 20,000 feet. Total power will be 4400 h.p. supplied by Wright Cyclones. High speed, 240 m.p.h.; at 20,000 ft.; cruising, 125 m.p.h. at 20,000 ft.; climb, 1250 ft. per min.; weight empty, 20,000 lb.; gross weight, 40,000 lb.



Boeing 314

A5C 114

THE 314 is Boeing's ocean transport. Power of 6000 h.p. is supplied by four Wright Cyclone-Two Cyclones. Access to the four engines is possible during flight by means of

passages in the wing. Total seating capacity is 35. Performance is as follows: high speed, 250 m.p.h.; cruising, 175 m.p.h. at 18,000 ft.; climb, 100 ft. per min.; service ceiling, 14,000 ft.; range, 3500 miles; weight empty, 41,841 lb.; gross weight, 67,000 lb.



Curtiss-Wright (St. Louis) Transport

IN A5C

THE CURTISS-WRIGHT transport is a 20-40-place two engine ship with a supercharged passenger cabin. Double-Row Cyclones supply the necessary power! Wings are

each divided and equipped with a new type slatted flap which may be used in extended positions for take-off, single engine flight, and landings. High speed, 260 m.p.h. at 20,000 ft.; cruising, 210 m.p.h. at 20,000 ft.; climb, 1400 ft. per min.; service ceiling, 20,500 ft.; range, 1500 mi.; weight empty, 24,750 lb.; gross weight, 35,000 lb.



Douglas DC-3

A5C 118

THE DOUGLAS DC-3 has become a familiar sight on your daily air trip large airports of the world. It seats 31 and can be had with either Pratt & Whitney or Wright engines

supplying a total of 5400 h.p. High speed, 250 m.p.h.; cruising speed, 190 m.p.h.; landing speed, 40 m.p.h.; climb, 1200 ft. per min.; service ceiling, 22,500 ft.; total fuel capacity of 523 gals. gives a range of 3125 miles; weight empty, 16,330 lb.; gross weight, 24,430 lb.; span 65 ft.; height, 30 ft. 11 in.



Douglas DC-5

IN A7C

DOUGLAS DC-5 high wing monoplane, triplane gear, 12 seats, two-cabin, Pratt & Whitney or Wright. Total 2200 h.p. Wt. empty, 15,274. Gross, 30,000 lb.



Douglas DC-4

IN A7C

DOUGLAS DC-4 4-engine version seats 48, has triplane landing gear, either Pratt & Whitney or Wright engines. Total 4400 h.p. 47,000 lb. gross.



Grumman G-21A

A7C 114

GRUMMAN G-21A presents the versatile Splice amphibian, G-21A. This ship is suitable to perform sea line work as well as being an ideal seaplane for the private owner.

Power is obtained from two Pratt & Whitney W-12 engines supplying a total of 500 h.p. at 2000 ft. Performance: high speed, 250 m.p.h. at 2000 ft.; climb, 1500 ft. per min.; service ceiling, 20,000 ft.; and range is 2000 miles. Weight empty is 4175 lb.; gross weight is 5500 lb.



Lockheed 44

IN A7C

LOCKHEED's offering to the line of four engine transports is the Model 44. It is equipped with a choice of four engines, either by Wright or Pratt & Whitney. Total power

can run from 4100 h.p. to 5100 h.p. Performance vary between the following limits, depending on power: high speed, 265-274 m.p.h.; cruising 220-242 m.p.h.; climb, 1330-1255 ft. per min.; range, 1510-1550 miles; weight empty, 34,335-35,515 lb.; gross weight, 50,000-45,000 lb.





Lockheed Lodestar (18)

See A-90

Two Navies in Lockheed Lodestar is a two-engine transport accommodating 14 passengers and a crew of three. Among the objectives of the design are: low cost.



of P. & W. Hornets give it a total of 5400-5500 h.p., at 3500-4000 ft. It has a wing span of 310 ft., with range of 3000-4000 mi.; fuel, 18,000-20,000 gals. Top speed is 130-140 m.p.h. at 5000-6000 ft.; cruising speed is 140-150 m.p.h. at 10,000 ft.; weight range is 21,200-23,200 lb.; while the gross weight is 23,000-25,000 lb.



Martin 134

See A-90

Two Martin 134s and 137s are a four-engine, 14-21 seat, seven transport. They are a larger version of the Lockheed Martin 132 (Glen Canyon). Its four Wright Cyclones

figures for this airplane follow: high speed is 130 m.p.h. at 7000 ft.; cruising speed is 140 m.p.h. at 10,000 ft.; climb, 1000 ft. per min.; range with normal fuel capacity of 400 gals. is 770 mi.; landing speed, 45 m.p.h.; weight empty, 15,500 lb.; gross weight, 18,000 lb.



Vought-Sikorsky S-43

See A-90

Two S-43s at Vought-Sikorsky is a 16-place amphibian powered by two Pratt & Whitney Hornets which supply a total of 1800 h.p. at 7000 foot altitude. The performance

Consolidated 28 Flying Boat

See A-90

Consolidated Model 28 is a 30 passenger flying boat. Two P. & W. Twin Wasps, total 2300 h.p. Cruising speed, 275 m.p.h. at 7000 ft.; gross weight, 27,000 lb.



Vought-Sikorsky S-44

See A-90

Vought-Sikorsky S-44 is a 18-seat, amphibian flying boat with P. & W. engines 4200 h.p., at 7000 ft. Cruising speed, 275 m.p.h. at 7000; gross weight, 27,000 lb.

MILITARY AIRCRAFT

DOMESTIC and EXPORT

For complete specifications see page 73

Bell Interceptor-Pursuit P-39

Bell's refined new Model P-39 monoplane-pursuit features retractable tricycle gear and a 12-cylinder, 1800 hp Allison in rear of cabin. Equipped for high flying.



Bell Alacuda YFM-1

Bell's Alacuda YFM-1 comes in a new design as a patrol fighter or bomber escort, with large range, fast, power, wide maneuverability. Equipped for high flying.



Boeing B-299T

Boeing Model B-299T, the Flying Fortress, with 4,000 hp from four Wright Cyclones, has top speed of 315 m.p.h. at 31,000 ft.; cruising, 230 m.p.h. at 10,000 ft.



Bellanca 28

The Bellanca Model 28 is a single ship like a Pratt & Whitney Twin Wasp engine, 800 hp. High speed 225 m.p.h., normal range 100 mi., climb 3200 ft. per min.



Brewster 239

Brewster Model 239 is a single-engine with a Wright Cyclone 750 hp engine. It has retractable landing gear. Performance figures are not released.



Consolidated 28

Consolidated's Model 28 18-engine flying boat features a wide range of possible operations. Some crew space, machine gun and landing equipment.



Consolidated 28 Amphibian

Consolidated's Model 28 Amphibian has two P & W Twin Wags delivering 2,180 hp total at 7,600 ft. High speed, 229 mph, at 7,600 ft.; max. range, 179 mph, at 7,600 ft.



Curtiss-Wright (Buffalo) P-40

The Curtiss-Wright Model P-40 is a single-engine pursuit ship with retractable gear, air-cooled motor, closed nose. Its retractable status makes specifications unreliable.



Curtiss-Wright (St. Louis) 22

The Curtiss-Wright Model 22 has a motor and all-glass instrument is of the all metal type with retractable gear. 428 hp. Wright engine.



Douglas B-23

Newest Douglas bomber is the Model B-23. This ship has improved performance and is expected to have a greater range and maneuverability than others of its type.

Curtiss-Wright (Buffalo) P-36-A

The Curtiss Model P-36-A follows the familiar Curtiss pursuit ship design, with retractable gear. Because of its restricted status, no specifications are available.



Curtiss-Wright (Buffalo) XS53C-1

The Curtiss Model XS53C-1 scout observation plane is 2½ lowwings and engine. With wheels and doors retractable, it is designed especially for the Navy.



Curtiss-Wright (St. Louis) 23

The Curtiss Model 23 is an advance form of model 22, powered with a Pratt & Whitney. This new pursuit ship is all metal, retractable gear and tail-wheel.



Lockheed 322-61

LOCKHEED'S Model 322-61 pursuit ship powered by two 1,000 hp Allison motors. The speed 484 mph, cruising 336 mph. Service ceiling 20,000 ft., range 600 mi.



Grumman G-37

The GRUMMAN G-37 is a single-engine fighter, powered by a Pratt & Whitney Twin Wasp, 1,800 hp. High speed 326 mph, cruising 223 mph. Normal range 1,100 mi.



Glen L. Martin 167-W

MARTIN'S Model 167-W bomber has two Pratt & Whitney Twin Wags. High speed 320 mph, cruising 224 mph. Climb 1,700 ft. per min. Service ceiling 30,000 ft.



North American NA-44

The NORTH AMERICAN Model NA-44 is designed as a side attack ship bomber, Wright Cyclone motor, high speed 260 mph, cruising 225 mph. Range 1,600 mi.



Republic EP-1 Model 100

REPUBLIC'S model 100 (EP-1) is an export version of the EP-1, with Pratt & Whitney 1,200 hp Twin Wasp engine. High speed 320 mph, cruising 240 mph. Range 5,700 mi.

Grumman G-37

GRUMMAN'S G-37 single-engine fighter has a 100 hp Wright Cyclone engine, high speed 273 mph, cruising 224 mph. Climb 1,000 ft. per min. Service ceiling 32,000 ft.



North American NA-40-A

NORTH AMERICAN'S 4-engine Model NA-40-A is an advanced high-speed bomber with two Wright Cyclone engines totaling 2,800 hp. High speed 319 mph, cruising 237 mph.



North American NA-50

NORTH AMERICAN'S NA-50 single-engine has a Wright Cyclone 650 hp engine and retractable gear. High speed 278 mph, cruising 225 mph. Service ceiling 30,700 ft.



Republic 2PA Model 200

The REPUBLIC Model 200 (2PA) two-engine is powered with a 1,100 hp Pratt & Whitney Twin Wasp engine. High speed 312 mph, cruising 232 mph.





Ryan S-T-M

The Ryan Model S-T-M military trainer is powered by a 180 hp Menasco. High speed 141 mph, cruising 125 mph. Climb 215 ft. per min. Service ceiling 24,700 ft.



Stearman A75L3

STEARMAN'S Model A75L3 biplane trainer is powered by a Lycoming 225 hp engine. Top speed 225 mph, cruising 225 mph. Service ceiling 13,500 ft., normal range 185 mi.



Vought-Sikorsky XP5B-1

The Vought-Sikorsky Model XP5B-1 is a four engine patrol bomber which was built for the Navy. Performance figures, however, have not yet been released.



Vought-Sikorsky V-134

The Vought-Sikorsky Model V-134 scout, dive bomber was designed for the Navy. 110 hp Pratt & Whitney Junior Wasp engine. Specifications available on request.



Vultee Valiant 31

VULTEE Valiant 31 two-engine, all-metal monoplane is powered by a Pratt & Whitney 300 hp Wasp engine. Top speed 248 mph, cruising 230 mph. Normal range 500 mi.



Vought-Sikorsky X502B-1

Vought-Sikorsky's Model X502B-1 is a scout-bomb aircraft equipped with wing tanks. A Ranger engine supplies the power. Performance not released.



Waco F-7

The Waco Model F-7 (LDP-1) two-place biplane trainer has a Lycoming 220 hp engine, does 215 mph top speed, 215 mph cruising with service ceiling of 14,000 ft.



Vultee Valiant 34

Vultee's Valiant 34 two-engine has a Pratt & Whitney Junior Wasp 300 hp engine. High speed 170 mph, cruising 145 mph, normal range 180 miles, service ceiling 30,000 ft.

IN-LINE DEFENSE



TWO new types of scout observation planes for the Navy, the Curtiss X501C II and the Vought X502B-1, signify a new trend in high speed observation ships for catapult use. In-line and air-cooled Ranger engines contribute to the outstanding performance of these two airplanes.

The six-cylinder Ranger, 6-440C II, powers the new four-child trainers now in production for the Army's augmented training program. In-line and air-cooled, these engines deliver 175 hp on 85 octane fuel, and combine rugged reliability with unequaled smoothness and noise.

RANGER AIRCRAFT ENGINES

Division of Fairchild Engine and Airplane Corporation

FARMINGDALE

LONG ISLAND

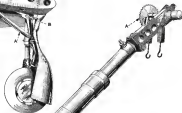
NEW YORK

SKETCH BOOK

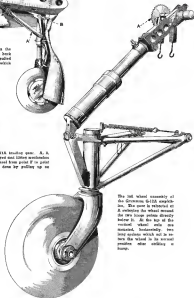
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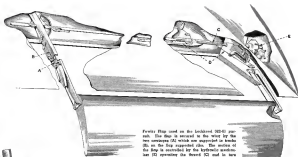
Landing gear structure mechanism as the Republic 1 PA. "B" is the knee joint link from which the oleo and wheel are pulled by arm "A" and mechanism at "C", which acts towards the landing oleo.



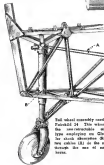
German G418 landing gear. A, B, C, D, are knotted and linked mechanism at E pulls wheel from point F to point G. This is done by pulling up on act EF.



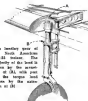
The tail wheel assembly of the German G418 airplane. The gear is situated at A, actuating the wheel around the two lines which directly follow to the top of the vertical wheel, only one connected, however, two line systems which act to secure the wheel in its correct position after landing is complete.



Power flap used on the Lockheed 30-40 plane. The flap is secured to the wing by the two cambrays (A) which are supported in brackets (B) on the flap supported ribs. The motion of the flap is actuated by the hydraulic mechanism (C) operating the second (D) and to the cables (E).

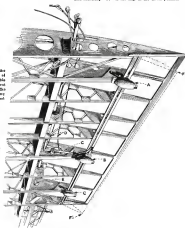


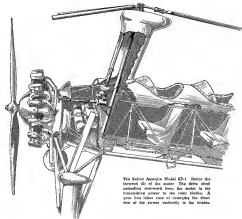
Tail wheel assembly used on the Fairchild 24. This wheel is of the retractable variable type employing an oleo and the shock absorber (B). The two cables (A) do the steering through the use of universal joints.



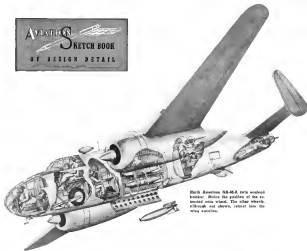
The landing gear of the North American NA41 engine. The mobility of the land is taken by the assembly of (A) with part of the torque link, which is the motion (B).

This mechanism in the Fairchild 24. It is of the type with the oleo at the three points A, B, C. The control of the mechanism is accomplished by the lever C at the rear of the oleo which is now in normal position by the two cables attached to the Fairchild 24, which operate normally. If in the flap in the down position.

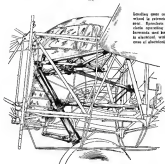




The Sikorski Avenger Model 42-1. Shows the forward 40° of the motor. The drive shaft extending rearward from the motor to the connecting power to the rotor blades. A gear box takes care of changing the direction of the power velocity in the blades.



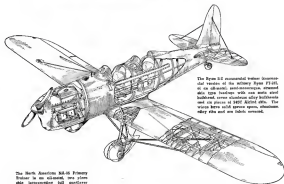
North American NA-60A, a single-engine biplane. Shows the position of the retractable main wheel. The other wheels, although not shown, retract into the wing sections.



Landing gear and retraction mechanism on the Cessna 540. The wheel is retracted by a retracting motor located under the pilot's seat. Retractors are located on the motor shell which drives the cable operating the system. Running the cable on the motor, forward and backward, raises and lowers the wheel. The motor is connected with both pistons to the up and down pistons. In case of accident before there is time a separate mechanical system.

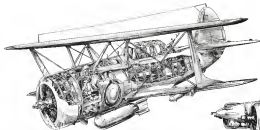


The frame of the Jenkins Dove T-17. This is the same construction used on the T-17 with the exception that the wing is two feet forward of frame spar.



The Ryan H.S. commercial trainer: commercial version of the military Ryan PT-109, it is all-metal, semi-monocoque, stressed skin type fuselage with one metal steel bulkhead, seven aluminum alloy bulkheads and six pieces of 3450 Alclad skin. The wings have solid spruce spars, aluminum alloy ribs and one fabric covered.

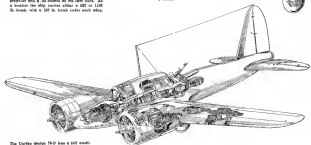
The North American NA-16 Primary Trainer is an all-metal, one plane, all metal, semi-monocoque fuselage with one aluminum alloy bulkhead directly aft of each engine. All semi-monocoque sections are all metal and constructed with aluminum alloy beams and metal covers. Spinless type full cantilever wing is used with a stressed skin, section supported by struts and ribs.



The Curtiss Red Bull (7) is a series of all metal construction and covering with its structure of the lower wing and control surfaces, which are fabric covered. The wing section is 30 or 40 Curtiss sections are fitted through the propeller and a 30 section on the rear fuselage. As a result the wing section is 321 or 118 ft. long, with a 100 ft. long center section.



The undercarriage of the design 74-D is fitted by means of an electric pump driven hydraulic pump operating down with automatic integral lock. As the 74-D is the landing gear in the design position.



The Curtiss design 74-D has a full metal wing consisting of a main panel and two detachable outer panels. The 45-foot fuselage is of semi-monocoque construction covered with Alclad aluminum alloy stressed skin.

The Curtiss design 74-D section four feet 80 inches section four feet in the nose. As the 74-D is shown the four changes after time in the nose extended for servicing and extending the span.





Partially corrugated fuselage of the Republic 1 P A. Notice the use of the "T" section struts that are jigs from the bulkheads, the ribs transferring the loads to the bulkheads.

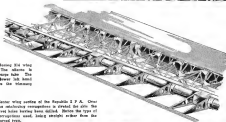


A cross section of the wing of the Republic 1 P A shows the structure for the spar to support the balanced and unbalanced ailerons, just in rear of the gas valve.

Partially corrugated wing tip of the Republic 1 P A. Notice the reinforcement by steel with the wooden form of the ribs at the bottom. This section is attached to the end of the wing shown on the top of the following page.



The partially corrugated wing of the Republic 1 P A. The inside surface of the wing is reinforced with corrugated aluminum alloy. The aluminum alloy has been installed in sheets in the lower right. This section has been attached to the structure below.



Section of the Republic 1 P A wing and aileron. The aileron is shown by the large hole. The section at the lower left hand corner is where the structure is located.

Center wing section of the Republic 1 P A. One of the reinforcing corrugations is shown at the top. The other side having been drilled. Notice the type of corrugation used, being straight rather than the curved type.



ENGINES FOR 1940

Showing representative engines
and for latest type of planes



The Pratt & Whitney Model 1885-C installed in a Douglas DC-4



Franklin engine mounted in an aircraft



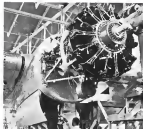
Typical back plane flying installation



The 14 cylinder Wright Engine Cyclone at 2000 h.p. Two of which were installed in the 12-passenger Cessna Model 31 Low Wing Flying Boat.



The Pratt & Whitney Wasp Jr. 32 installed in a Grumman G-41 Amphibian



A Continental A19-B in a Cessna



The Franklin Engine installed in the new 32-passenger Cessna-Wright Submarine Transport



Waco Model 105 Super Scout



Jacobs Model 2-400



Beechcraft Model 27



The Hommer Plane in a Rockwell Model 55-AE Trainer



Beechcraft Model 54000 installed in a Petrolia P-4000

we ask you
ask the man who FLYS one*

* The most popular light plane engine
in the country today is Franklin! For
proof—we paraphrase this famous slogan
—and again ask you . . . ask the man who
FLYS one!

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* with *Isomys* in *Peromyscus*

American Aircraft Engine Specifications

AVIATION does not assume responsibility for the items shown.

[illegible]

Aircraft Performance									
Type									
Model									
Manufacturer									
Year									
Engine									
Horsepower									
Altitude									
Speed									
Range									
Fuel									
Weight									
Capacity									
Price									
Notes									
Remarks									
References									
Sources									
Comments									
Details									
Specifications									
Features									
Options									
Accessories									
Maintenance									
Training									
Safety									
Reliability									
Durability									
Flexibility									
Versatility									
Adaptability									
Compatibility									
Interoperability									
Integration									
Connectivity									
Communication									
Data Exchange									
Network									
Protocol									
Standard									
Compliance									
Certification									
Approval									
Authorization									
Permit									
License									
Registration									
Identification									
Tracking									
Monitoring									
Control									
Management									
Operation									
Performance									
Efficiency									
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臺灣大學社會學系教授、政治學系教授、政治學系教授、政治學系教授

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confidence for the figures given

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to find out why some
behave as they do.

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A.W.J.A. BLOK, February 1988 • 75

DIRECTORY OF

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AVIATION
February, 1961
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SIKORSKY XPED-1

CONSOLIDATED P&L \$

SUKORSKY, KPM-2

1995年4月25日 星期三

BRUNNEN F&F 2

MARTIN POLME

CONSOLIDATED P2Y-3

CONSOLIDATED PIV-2

DIRECTORY OF ENGINE MANUFACTURERS

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MARTIN POM-1



CONSOLIDATED P2Y-1



CURTISS ELECTRICS
ON PATROL
with the NAVY

The U. S. Navy, "Birds with Feathering" in 1934, when it equipped its Consolidated P2Y-3 Patrol Planes with Curtiss Electric Propellers, is again first in developing, with Curtiss engines, the Reverse-pitch Propeller to provide its gun airplanes with water-surface-landing ability hitherto unparalleled. Another degree of utility has thus been added to the outstanding four-engined Consolidated Patrol Bomber.

The adaptability of Curtiss Electric has also led to their selection for the Navy's newest fan lighters in which air-maneuverability and high performance are paramount.



Republic Steels for Aviation



In 1916, the first chromium-nickel-molybdenum crankshaft steel for use in Liberty motors was made in the plant of United Steel Co., now a part of Republic Steel Corporation. Today, Republic is supplying steels to the leading manufacturers of aircraft, engines and parts—and is the world's largest producer of quality aircraft steels.

THE ECONOMIC SELECTION of steel for any aviation need requires a study of the specific application. Research has developed in many new steels and the uses of steel in aviation service are so varied that no definite recommendations will be attempted here. However, a glance over the uses to which Republic steels have been applied in aviation will convey an idea of the customer in which this company, its divisions and subsidiaries are serving this fast-growing industry.

All Republic steels are made from ore taken from Republic ore mines, smelted in Republic blast furnaces and processed to the final form in Republic plants. One responsibility carries through every operation—and every operation is continually subjected to test and inspection.

Republic aircraft steels are the result of years of experience in producing high quality steels for special purposes. After a base of aircraft steel is poured, it is followed carefully through all operations. Complete identification is kept throughout, so that at all times any piece can be identified. Tests are selected from predetermined positions in the heat. These are examined by both the mill and laboratory metallurgists and must meet Republic's standards before being released for shipment. Through years of experience and constant research, Republic Steel Corporation has been able to produce aircraft steels which are satisfactorily meeting today's rigid requirements.

Republic Alloy Steels

Republic Alloy Steels have been used for years in aviation and have made a reputation for quality in:

Crankshafts	Cam Rings	Crank Cases
Master Rods	Piston Pins	Rollers
Link Rods	Gears	Reduction Gears
Propeller Shafts	Ball Valve Rings	Reduction Pinions
Cylinder Sleeves	Shafts	Fixed Reduction Gear Pinions

PROPELLER PARTS

Hubs	Half Bolts	Control Ropes
Blades	Control Brackets	Control Gears

Steels for these purposes must be "mill-made" to a greater degree than to a general industry. Close cooperation must exist between the manufacturer, large ship and steel producer to insure satisfactory quality. Knowing the physical properties required and the processing equipment available, Republic will work with you in the selection of the most reliable steel for any purpose—or develop a steel to meet your special requirements.

*ENDURO Stainless and Heat-Resisting Steels

The present widespread use of the many alloy steel combinations under the stainless and heat-resisting classifications is a definite answer to the question, "Is aviation ready

for stainless?" The parts for which these stainless are being used with increasing frequency include:

Silver Steel	Stabilizers
Manifolds	Exhausts
Collector Rings	Intake Valves
Heaters	Heat Shields
Diaphragms	Wing Construction
Pressure Construction	Wing Covering
Tail Units	Elevators
Fuel Tanks	Cables
Autolens—Sails—Mats—Rivets—Turnbuckles	

Here, again, a close study of the intricate details of service is necessary to the selection of the correct type of stainless or heat-resisting steel. And here again Republic's research and experience can be turned to the advantage of makers of aircraft, engines and parts requiring steel with high tensile strength, resistance to corrosion or the ability to withstand high temperatures without softening or burning or loss of strength.

Products of Republic Divisions and Subsidiaries

Cold drawn, hot and special sections made by the Union Drawn Steel Division are widely used by the aviation industry for the manufacture of parts for engines, planes and instruments.

Turn Nuts, Wing Bolts, Locks and Shocks are manufactured by the Berger Manufacturing Division—to save time and materials in the industry's manufacturing plants, service hangars and support buildings.

Welding manufactured by Steel and Tube Division, under U. S. Army Specifications No. 57-180-6 and U. S. Navy Specifications No. 46-T-20, both covering welded chromium-nickel, corrosion- and heat-resistant tubing for fabrication into exhaust stacks. Other types of tubing include stainless steel for fuel heaters for carburetors, open tank and Chrysler steel joints, metal bins, ferrous and non-ferrous, structural steel, reinforcing bars, pressed steel tanks, concrete highway reinforcing products for highway floor, apron and runway construction, and boats and platforms for marine buildings.

Republic Union Quality bent and threaded products comprise a line of more than 20,000 items, including standard and special bolts, nuts, rivets, pins, washers, wire rope clips and similar items in carbon, alloy and stainless steel—many of them in inventory at the aviation industry.

All the resources of Republic Steel Corporation, as well as its extensive research facilities and the experience of its staff of metallurgists, are available to manufacturers of aircraft, engines and parts, to airlines interested in field development and to independent steel base operations interested in building or field construction. Address your inquiry to Republic Steel Corporation, Republic Bldg., Cleveland, O.



Aircraft engine cylinder sleeve made from Republic Manilla steel.



Three-way propeller spacers made from Republic chromium-nickel-molybdenum steel.



Republic alloy steels are extensively used for engine parts. Republic chrome-nickel steel is shown in the manifold ring of this engine.



End sections of a few of the many standard and special shapes available in Republic "Electronite" tubing.



Trucon Series 3 covers 80' clear on the plant of The Glenn L. Martin Co., Baltimore. This is the largest door of its type in the world, 300' wide by 43' 3" high. Each unit can be operated independently or simultaneously with each or both of the other units. The entire door can be opened or closed in 30 seconds.

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Aug. 12, 1940

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Figure 1: A grayscale micrograph showing a dense, granular surface texture, likely a cross-section of a material. The texture consists of numerous small, rounded features packed closely together.



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 300 Park Ave., New York 17
 Radio Research Co., 214 W. 11th St.
 St. Paul, Minn. - Lucely Adams
 C. Fox - Eugene C. Glitz
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 poration, 100 Broadway
 Empire Radio Co., 5077 Lehigh
 Ave., Brooklyn, N.Y.
 Ear Day Sales Corp., W. Warren &
 Sons, 100 W. 42nd St., N.Y.C.
 Fox - C. Day
 Radio-Television Products Co.
 Radio-Television Corp., 100
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Developed with the splendid co-operation of the U. S. Army, and designed specifically for fast mass production, the Mioten Model 187W combuster is a high degree of the three primary essentials of tactical utility—manoeuvrability, speed and fire power. A four-purpose military plane, it functions as a high-speed bomber, for long-range reconnaissance, for ground attack or as a two-engine fighter, without sacrifice of the desirable characteristics of any of these types. Mioten 187W is a reliable fast runner. Correspondence is invited.

THE GLENNE L. MARTIN COMPANY, BALTIMORE, MARYLAND U.S.A.

ANALYSIS OF DOMESTIC ASSOCIATE AMER. EXP.

By Don Fink
Staff Editor Aviation

A DESCRIPTION of a very significant advance in the art of instrumentation in aircraft was read to the Institute of Aeronautical Sciences at the Eighth Annual Meeting, January 28th, by Francis S. Bussert, Chief Engineer, and Joseph Lyman, Senior Project Engineer, at the Sperry Gyroscopic Company. The subject of their paper was "The Flightray: A Multiple Instrument Indicator."

Briefly, the Flightray indicator is a cathode-ray tube, an electronic device similar to that used in superhighway television screens. The cathode-ray tube is a funnel-shaped glass structure, closed with a glass face at the wide end. This face has coated on its inner surface a layer of electron-withdrawing (fluororubinate) which is a fluorescent compound capable of glowing when electron impacts on it. At the other (narrow) end of the tube is an electron gun that can discharge streams capable of focusing a beam of electrons which is shot through the tube to the fluorescent screen opposite it. The beam of electrons, falling on the screen, produces a spot of light, green in color and brilliant enough to be seen under any condition of outside illumination. The beam of electrons may be deflected so that the spot of light falls on any portion of the screen.

By controlling different values of vertical and horizontal deflection, the beam may be aimed at any point on the fluorescent screen.

Because the electron beam has velocity as inertia, it must be moved over the screen at a very rapid rate. If the beam is moved across the screen in a small fraction of a second, the flat viewing the screen appears to see a straight line rather than a moving spot, due to the persistence of vision.

The Flightray indicator makes use of the cathode-ray tube because of the very great flexibility with which lines and colors may be drawn upon it, and the capability with which the indications may be made. Actually, the indications of four instruments are shown on the fluorescent screen in case, with



FLIGHTRAY Ready for the Field

gun tubes for rendering to a tilt. The instruments are the gyro compass, the artificial horizon, the blind-leading receiver, and the air speed indicator. An alternative receiver in the altimeter is available for level flight and is switched into the circuit in place of the blind-leading radio receiver. Also, provision has been made for the central indicators of the electronic radio compass on the same screen.

It is obvious that simply bringing all these indications to the face of one instrument is not a solution to the problem as well, because the pilot could easily become confused by the multiplicity of readings, unless they were coordinated with the nature of the plane and with the psychology of the pilot in controlling the plane's attitude, direction and speed.

The central feature of the indicator is the small black figure of the airplane which represents the ship as the

pilot would see it from the air. The indications on the face of the instrument are considered as stationary, and the attitude of the plane is considered in more with respect to the indications.

The indications are as follows: The long horizontal line passing through the center of the plane is a representation of the lower bar of the artificial horizon instrument. As the ship tilts with respect to the horizon (on the artificial horizon), this bar remains on the true horizon, whereas the outline of the ship moves above or below, and at an angle so, the bar is exactly the same distance in the visual field between instruments. The indication of the gyro compass are simply transmitted directly to the face of the cathode-ray tube. The short vertical line at the top of the screen is similarly controlled by the gyro compass, and is followed by the scale mark-

ings directly above it. The short horizontal line below the horizon is controlled by the air-speed meter. Likewise, the indication of the altimeter is set so that the line takes up a position just under the wings of the figure of the plane, when the landing speed is indicated, whereas the line drops lower for lower speeds, and the short black mark at the bottom is a warning that the stall speed is being approached. Finally, the circle of light which surrounds the center portion of the figure is controlled by the indication of the blind-leading receiver. Any blind-leading receiver which gives horizontal and vertical guidance information can be used to control this circle and the control is arranged so that the figure of the plane takes up a position, relative to the circle, which is the same as the actual position of the plane relative to the guide post. When the first level light, the instrument landing receiver is discontinued and the altimeter converted to its place, in that event the figure of the plane takes a position above or below the circle, depending upon whether the plane is flying above or below the reference altitude, which is set on the altimeter scale.

The Flightray indicator thus coordinates and presents to the pilot continuously all the indications of four flight instruments, and it does so in such a way that no confusion will arise. In instrument landing, for example, the pilot tips the ship so that the nose is on the circle, keeps the horizon indicator on the same and

horizontal, and soon to it the landing speed is maintained. He need not take his eyes off the instrument area during the descent. When the actual marker of the instrument landing system is passed, the green light in the upper right-hand corner flashes, and when the lower marker is passed, the red lamp in the opposite corner flashes.

Technical details of the system

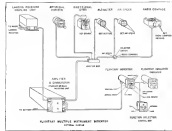
The technical requirements used for bringing the indications of the various instruments to the cathode-ray indicator are shown in outline form in the accompanying diagram. The connection to the instruments themselves is accomplished through Collins Teflon connectors, which are small air-tight motor units which are capable of indicating the position of a rotating member at a distant point by transmitting a three-phase voltage over wires. The transmitting system does not employ any rotating winding, that is the other "wires" is a stationary set of windings not dissimilar in form of a three-phase synchronous motor. The moving element of the motor whose indications are to be picked up (the gyro compass, gyro horizon, air speed meter or altimeter) is fitted with a very small and light magnetic element which cooperates with the instrument. This magnetic element produces a magnetic field in the windings of the Teflon connector which is directed directly to the rear of the instrument. Wires lead from the transmitting Teflon connector cables, properly placed to meet similar (receiving) Teflon sets, at

the opposite end of the cable, to take up a position corresponding to the position of the rotating element at the original instrument.

The motion of the various Teflon wires out for each instrument, are contained in a distributor unit which controls their individual motion into cables required to deflect the cathode-ray beam. Since there is only one beam in the cathode-ray tube, and since it must indicate for four instruments simultaneously the beam must be controlled successively by the Teflon post associated with the instruments and this instrument distributor is accomplished by a motor-driven commutator mechanism. In order to avoid any flicker from this instrument commutator, it is run at a frequency, in this design, the cycle of the instrument 60 times per second. In other words, the indication of each of the four instruments is applied to the beam every time each second, and the indications are interrupted in sequence. This 240 segments control voltage are applied to the beam every second, and the beam takes up positions which appear simultaneously before the eye.



The motor-driven commutator has, mounted on the state shaft, several brushes, one of which draws the first from a 12-volt storage battery, others develop the voltages necessary for deflecting the beam, and also the high voltage (2000 volts) necessary to operate the cathode-ray tube. The whole apparatus weighs about 60 pounds, and consumes about 150 watts (on the demonstration, 9 amperes at 11 volts). The Flightray is not aimed commercially at present, but a preliminary production will be available for test flight by the airlines and by army and military services.



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Bellanca offers a combination of services to the flying world seldom found in one organization—for over a dozen years a consistent producer of outstanding, record-breaking planes, which are also universally known in military, commercial, photographic, ambulance and cargo services. Its engineering ability embraces types from 3-place to 18-place, on wheels, floats and skis, and from 90 H.P. to 2,000 H.P.

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SEAPLANE

THE AVIATION NEWS

BYLINE, COMMENT, FORECAST

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FEBRUARY 1940

Congress Considers More U. S. Air Power

(Continued from page 100)



PRESIDENT ROOSEVELT, who would risk even tougher than he does to aggressors if the country would let him, has asked for \$1,215,000,000 to speed national defense in 1941. Even after his budget is trimmed, Americans might as see and catch will get plenty of money to go on increasing. Here is a pilot's eye view of the new \$100,000,000 airplane carrier "Akagi" being moved away from the United States Steel Company's shipyard at Fort Ross, Mass., for a trial run. The hulls over parts of the deck to show some equipment. Navy officials at the Flying Fortress assembly line in the Boeing Aircraft Company's Plant No. 2 at Georgetown, Seattle. You see four of the world's mightiest war planes in various stages of completion. The wings were built up, complete engine nacelles, in another department, and brought to this assembly room. Protection is at the risk of one ship away from working days. These bombers are built for long range because this country has great distances to contend with.



Authority Considers Proposed Air Routes

Important additions to the country's air route system will be the new routes for the summer. Airways have been completed on the applications of Western Air Express and United Air Lines for the run from Great Falls, Minn., to Litchfield, Minn. United Air Lines will submit the proposal to the NACA's air route committee in April.

Northeast Air Lines has applied for Chicago-Denver-Tennessee-New York. Eastern Air Lines has applied for New York-Chicago-Tennessee-New York. Eastern Air Lines has applied for New York-Chicago-Tennessee-New York. Eastern Air Lines has applied for New York-Chicago-Tennessee-New York.

President Truman has directed the Civil Aeronautics Administration to study the proposed routes. The Civil Aeronautics Administration is the agency that regulates the airline industry. It is responsible for the safety and efficiency of the nation's air transport system.

On Jan. 2, shortly after the Civil Aeronautics Administration was created, the President directed it to study the proposed routes. The Civil Aeronautics Administration is the agency that regulates the airline industry. It is responsible for the safety and efficiency of the nation's air transport system.

Trucking of rights between the United States and Canada has gone ahead slowly as a result of the recent agreement between the State Department and the Canadian government. The agreement allows for the exchange of rights between the two countries.



DR. PAUL HASTINGS has the new NACA Commander of Research. With **AVIATION** staff, he has had a wide background of commercial experience to provide aid for the research work he is now undertaking. As Assistant Secretary of the National Aeronautics Administration, he was in charge of the research and development work of the agency. He is now in charge of the research and development work of the agency.

What About the Airports

Although airports facilities are being rapidly expanded, the Civil Aeronautics Administration is studying the need for new airports. The agency is responsible for the safety and efficiency of the nation's air transport system.

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NACA's Report Cited

CAA's report cited the need for new airports. The Civil Aeronautics Administration is studying the need for new airports. The agency is responsible for the safety and efficiency of the nation's air transport system.

the students had studied the site plans. Chairman Robert H. Woodbury says close to 30,000 students will be required by the end of next June. He said he was gratified by public response of the plan to train non-military students. Several of the firms participating are adding labs or otherwise expanding the school's facilities of CAA.

A recent conference showed that of 100 graduate students, \$5 were in the Air Corps. The Air Corps is being broken up, and in getting students, but in getting enough men who can qualify CAA's goals are a big help in the aviation program. The Air Corps is being broken up, and in getting enough men who can qualify CAA's goals are a big help in the aviation program.

Two hundred of 210 students who graduated a questionnaire had been sent to him. He said that an average of 20 students in each school are in the Air Corps. The Air Corps is being broken up, and in getting enough men who can qualify CAA's goals are a big help in the aviation program.

Under the program of war expansion, the Civil Aeronautics Administration is studying the need for new airports. The agency is responsible for the safety and efficiency of the nation's air transport system.

New Labs Needed

Under the program of war expansion, the Civil Aeronautics Administration is studying the need for new airports. The agency is responsible for the safety and efficiency of the nation's air transport system. It is responsible for the safety and efficiency of the nation's air transport system.

Program Going Strong

The Civil Aeronautics Administration is studying the need for new airports. The agency is responsible for the safety and efficiency of the nation's air transport system. It is responsible for the safety and efficiency of the nation's air transport system.

Fuel On Strategic List

Aviation products is included in the list of strategic and critical materials by the Bureau of Mines which will report monthly production, stocks and use.

First report by the Bureau showed total production of 334,000 barrels in October, 1939, representing 1.6 per cent of all oil in the world and ranking eight from various methods.

Stocks on hand amounted to 1,400,000 barrels, although part of these had already been sold and would ship out. Exports totaled 30,000 barrels for the month. Although domestic consumption has increased rapidly beyond the 1939 average of 300,000 barrels monthly, the Bureau estimates a substantial stock accumulation.

Producers reported domestic aviation gas capacity at 1,800,000 barrels per month. Average output during 1939 was 1,200,000 barrels per month.

In The Air

Don't be surprised, the most important factor in the war effort is the air. The air is the most important factor in the war effort. The air is the most important factor in the war effort.

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Don't Try Foolish Flying

Washington—But judgment, lack of technique, and lack of "know-it-all" spirit, are the major causes of most aviation accidents, according to the Civil Aeronautics Administration.

Latest figures at the Air Safety Board show 205 such accidents in 1939, but no serious accidents other than a few very serious ones.

Two accidents brought the most serious consequences to the public. The first was a crash landing in a field, and the second was a crash landing in a field.

The first was a crash landing in a field, and the second was a crash landing in a field. The first was a crash landing in a field, and the second was a crash landing in a field.

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THE WASHINGTON WINDSOCK

By BLAINE STORREFIELD

Designing Post-war Civil Planes

Lesson No. 1: A new design for the Air Corps has been made. It is a new design for the Air Corps. It is a new design for the Air Corps.

Designing post-war civil planes. The Air Corps is studying the need for new airports. The agency is responsible for the safety and efficiency of the nation's air transport system.

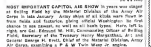
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AVIATION MANUFACTURING

Big Ships Booming

If another example is needed that it never rains but it pours, note that the same year that brought a kind of war order was a 40% increase in passenger sales flown by domestic airlines. One trend is increased interest by the airlines in the civil craft.

Douglas is now in production on 10 of its new DC-4 four-engine, four-passenger ships. Plans of those for the American Airlines order. American, incidentally, is just starting to take delivery on twenty DC-3s. United Airlines is taking ten of the DC-4s and Eastern Airlines is understood to be taking eight.

Vought-Sikorsky division of United Aircraft started work on three four-engine flying boats for American Export Airlines. Construction of their conventional past related work covered in the \$2,500,000 contract depends on whether American Export is granted a C.A. certificate for its proposed trans-Atlantic service.

Curtis-Wright is now making flying boats on a 30-passenger subminiature airplane. This is a two-engine job with a speed of about 300 m.p.h. at 30,000 ft. Lockheed, also, is developing a big four-engine transport.

For American Airways has orders to construct a new ship for Curtis-Wright, Douglas, Lockheed Martin, North American, and Vought-Sikorsky. The ship will be used for trans-Atlantic service. The airline will be its seventh capable of transporting a payload of 17,000 lb. on its way to Atlantic crossing of which it has then 300 tons per hour.

Backing Kees Grawing

Efficient entry of the British into the military aircraft market is the big news. England wants at least 25,000 planes over the next 10 years. American manufacturers have been alerted. Big purchases previously have been French, but British are nearly set to do orders totaling about \$10,000,000 for more than 800 ships, including 100 bombers.

This is not their own, however, their buyers now have their choice of orders before 1941. The industry expects the year with an airplane backlog of better than \$150,



VULTEE EXPANSION is moving toward completion. The present plant expansion at Quincy, Calif. After \$200,000 will square up to 300,000 sq. ft. and \$50,000 worth of new equipment is being installed.

\$100,000 and another \$50,000,000 in construction cost supplies. From orders of \$100,000,000 by year-end to \$100,000,000 a month, the manufacturers are looking up at least a year ahead.

Of the \$100,000,000 backlog, Ford Motor, General Motors, and Chrysler are the largest. Ford is expected to order 100,000,000 in 1941, 100,000,000 in 1942, and 100,000,000 in 1943. Chrysler is expected to order 100,000,000 in 1941, 100,000,000 in 1942, and 100,000,000 in 1943.

Manufacturers are still—and will probably continue to be—pretty nervous about new orders in military orders. Some industrial planning is being done, however. The National Industrial Conference Board, for example, is now making a study of the military aircraft market.

General Motors is now making a study of the military aircraft market. The National Industrial Conference Board, for example, is now making a study of the military aircraft market.

Alfred Purchasing Board

After purchase of war supplies last year, about 10% of which is aircraft, comes order which is the Army-Peacetime Purchasing Board. Arthur T. Parry is chairman. A Washington office is expected under Major Hyde, in



NEW FACTORY and office of the Agricultural Corporation of America at Middletown, Ohio. Germany is moving from its first location in London Airport. Cincinnati will be its expansion by next spring. Right-Carl Pfeiffer, president.

Aids to Aircraft. In connection with its current independent, Hoyer Bode Corp. is expanding beyond the auto field and will manufacture aircraft, parts, and accessories.

And Sea Gliders. Probably new orders have nothing to do with the fact that Stinson Aircraft Corp., (Hawthorn Riverway Plant, Alhambra, Cal.) recently moved into an auto and plant at Elmont and is getting into production on a utility glider and a two-place airplane.

Martin's New Airport

American's biggest aircraft factory building, the Glenn B. Martin airport, which cost \$1,200,000, went into service last September. It is designed for landing and for storage delivery. Of its four runways, the East Runway, which is 2,000 feet long and 100 feet wide, is now in service.

Expansion Continues

Curtis Propeller at 3 Apts. With expansion of its facilities becoming practically a habit (American, January 7), the Curtis Propeller Division of Curtis-Wright last month moved an additional 30,000 square feet of floor space in a factory building at Glendale, N. J.

The new space will be devoted to experimental and manufacturing work. Space acquisition of the division in the last three months total \$60,000 in N. J.

More Aircraft. The Grumman plant has moved and is now building. Americanized Corp. of America is now building a larger plant in Holliston, Mass. It is a 37,000-sq. ft. factory, often, experimental building, and several aircraft. Production starts in March.

Naval Station. Naval Aircraft Corp. of Chicago, during the past six months, has doubled its plant space and quadrupled its personnel.



Winged Victory



Stinson PRESENTS THE NEW "105" FOR TWENTY A TRIUMPH OF PROGRESS

A machine making for the longest life, the brilliant new "105" for 1940 is a triumph in air progress because it makes four personal air transportation available at low cost. • A revolution but pure because of its unparalleled safety record, its ability, its elegance and obvious quality, the new "105" has really increased performance and many valuable refinements. • It opens new depths in useful pleasure for the thousands who share the finer things, because they demand value as measured by quality and price.

(Place the page for further inquiry)

AVIATION ABROAD

Bomber Escorts in Style

Last month's increased air activity in the war was not only more plentiful of wings that it might happen up before long, but also brought in enough data to suggest a few elements of excitement. The North Sea saw most of the action, but there was a big difference between the way the Germans and British went about it.

The Germans, back in their high reconnaissance and bombing flights over the coast and in their low altitude on ships, seemed almost entirely in small groups of a few planes.



NO, THIS IS NOT NORTH BEACH—it's Heligoland, one of the most modern in the world. Before the war, this was the port of call for Polish, Spanish, German, British and Dutch Companies. That's the control point in the center.

It would be to increase the number of bombers per raid up to the hundreds before the war, which might be enough to get through the defense completely enough to get past ships with a considerable small loss. The other would be to keep on with small scale raids, but provide them with enough heavy fighters to get through the defense completely enough to get past ships with a considerable small loss. The other would be to keep on with small scale raids, but provide them with enough heavy fighters to get through the defense completely enough to get past ships with a considerable small loss.

Adding up the movements of both sides, it looks as if attacks followed on the ground would be more of a matter of time than of place, and that the British side has shown off more. There are certainly two ways out of this situation. One



FIVE BRITISH-MADE Fairey Battle monoplane bombers flying over some parts of the coast. The "Batties" is powered with Rolls-Royce Merlin 150 in 1000 hp. engine. It reaches a maximum speed on the level of 207 miles per hour. In the center view of two with a considerable loss of height. Heligoland ship would land on restricted port.

they had not about them. Just what they saw the British don't know. Some expect them to move out to be the two western fighters, but to be under way in quantity, but earlier days about their bookish, and didn't come there with any remarkable long range. Another possibility is the British had a few, a few fighters about which little has been heard since it was revealed last evening, except that it's known to be in production. This is a new looking monoplane about the size of a Hurricane and with the same Rolls Royce Merlin 150, but looked the pilot is certain a power up-ward, making the plane look like a performance it would have been enough for long range work in a quantity.

The British still talk about new ways better a lot of new ways are still in the air, and they're probably right as far as tactics between fighters as far as against bombers. However, the small group may have not to have the edge in the better raid to date carried out by the British against the German North Sea lanes, the British had spent them were able to show up, and with their small group from ranges as great as 1000 yards, and small scale, making quite a lot of an expense. For many, the small group of the small group, but at the number of both sides' bombers, which fighters captured a launch of his with modern guns, but not lower side side up.

Concern vs. Machine Guns

The British, in spite of the great things they claim for their turret-mounted bombers, also mention that they have plenty of long range fighters coming along, and possess the airbus in the line of a factor side to go a couple of hundred

Japs Are Expanding

The Japanese are stepping out at last into the world with a new type of aircraft, and it is seen in February between Tokyo and Bangkok, which will give their system a jump to foreign lines for the first time. The announced route goes by way of Yokohama, to Penang and Hong Kong, French Indo China. Former flights have been made with Japanese-built equipment, and the new service will use Sikorski Shrike 5M18. Five of these ships are supposed to have been ordered by the Japanese, but more coming later in the year. The Japanese, by the way, must have got the DC-4 put back together about the way it was meant to go, as it's reported making local flights around Tokyo.



WESTERN UNION

JAN 1 1940

EXPO 23 A EXHIBIT BOSTON BY 15 231P

TO AIRCRAFT MANUFACTURERS EVERYWHERE

SUNCOOK PRODUCTION CAPACITY OF 300,000 YARDS OF FLIGHTEX

AIRCRAFT FABRIC WEEKLY ASSURED PROMPT SHIPMENT OF ALL

ORDERS EVEN IN THESE DAYS OF PEAK BUSINESS

SUNCOOK MILLS 40 WORTH ST NEW YORK

FLIGHTEX

WORLD'S PREMIER AIRPLANE FABRIC

SUNCOOK MILLS

(BOSTON) MANUFACTURERS OF FABRIC AND TAPES FOR THE AIRCRAFT INDUSTRY

FLIGHTEX FABRIC

40 WORTH STREET, NEW YORK

Branches: Birmingham—Boston, Portland & Everett, Me., St. Louis, Mo., N. Y. Cities: Atlantic City, New York

RETAIL DISTRIBUTORS: AIR TRANSPORT EQUIPMENT CO., INC., 1001 CITY AVENUE, San Francisco, Calif.; AVIATION SUPPLY CORP., 1001 CITY AVENUE, San Francisco, Calif.; KALU OET YUL, INC., 1001 CITY AVENUE, San Francisco, Calif.; THE AIRCRAFT STEEL & SUPPLY CO., 1001 CITY AVENUE, San Francisco, Calif.; and South San Francisco Airport, San Francisco, Calif.

AVIATION PEOPLE



BIRLING MAN three days in Larry Blumstein, for he is receiving many congratulations as his firm celebrates its tenth anniversary. In brief case of ten years the Gramman organization has grown from a small and almost unknown firm to one that is internationally known.



MEET ROBERT HONER to Major James H. Dierksen was that of being elected President of the Institute of the Aero-nautical Sciences. Aviation Director for Shell Oil division is not only a top-notch pilot but is a distinguished aeronautical engineer as well.



BRIG. GENERAL WALTER G. KINNER, appointed by the President in the meeting in the National Advisory Committee for Aeronautics named by President of Gen. Lindbergh. In Gen. Kinner, NACA is getting the assistance of a man with great aeronautical experience.



FIRST TO RECEIVE Charles Award of Institute of Aeronautical Sciences is named from pilot Edward T. Allen, Director of Aeronautics and Flight Research for Boeing Aircraft. He is given annually to pilot making outstanding contribution to aeronautical sciences.



RUBE M. THRELKELD is now in charge of the purchasing in his country of civilian equipment for Finland. Rube has returned here last month after spending considerable time in Finland helping to organize its defense. He is well qualified as a man as the Finn could choose for the job. He knows American products and has a firsthand knowledge of the Finnish weather conditions which aircraft and engines are subjected to when operating in the far north.



A. H. MARSHALL, vice chief of Sales Engineering at Pratt & Whitney, in his 11 years with Pratt & Whitney he has been experimental test work, built test houses, done planning and testing of engine installations and been head of the Institute of the department. He is well fitted for his new work as his former jobs with P & W took him all over the world through the company. He has been company representative at most of the technical large aircraft factories and knows what the buyers want.



TWO WRIGHT AERONAUTICAL MEN moved up the ladder in January. Benson Adams, right, was promoted from West Coast representative to managing of Wright's new selling division of the Sales and Service department, East Yampa. Left, chief engineer for this company, was promoted to West Coast representative. Adams joined Wright 26 years ago, the day after he graduated from Yale and has had a variety of engineering and sales experience. After working in the assembly department he joined the test engineering staff, then acquired the field engineering division, later entering the sales department and becoming assistant of his first major sales subsidiary. Adams has been with Wright several years and previously had 11 years of military and transport flying, the latter with Air America. After the military service, he joined East American in 1952, serving as a pilot on a South American run, and in 1958 acting as chief pilot of a division. He has flown some 5,000 hours.



AT THE AIR SHOW exhibition is two hangars at Belling Field, Washington. Glenn H. Hager, airplane manufacturer (right) is exhibiting the new section of one of his medium bombers, with Capt. P. M. Timberlake, of the Air Corps chief pilot. At least \$100,000 worth of Wright Field research equipment and testing was exhibited, much of it shown publicly for the first time. Captain Clarence E. Irvine, in charge of this show, stated there was nothing about strength design or manufacturing that was not on display. The entire exhibit was well arranged and well displayed.



PROMINENT AMONG AWARD made at the Harvey Wright dinner of the Institute of the Aeronautical Sciences was the presentation to Charles J. Head of the Systems Award. Head joined for 1951. Charles Head said: "For the design and development of high speed aircraft engines."



MOVING FROM ASSISTANT works manager for Lockheed to General Manager of the subsidiary firm, West Aircraft Co., H. E. Ryker is now in charge of all West operations. Ryker has made valuable contributions to Lockheed's development of its improved history procedure, procurement and standardization methods.



WEST COAST REPRESENTATIVE for Pratt & Whitney is Robert A. Gaudin, chief of Pratt & Whitney's West Coast sales office since 1952, he moved to the field. In the field, he is now in charge of the sales department and later to sales. Before his recent promotion he was vice president of the West Coast office.



NEW ASSISTANT Sales Representative for Pratt & Whitney is William R. Gaudin, vice P & W since 1952, he moved to the field. In the field, he is now in charge of the sales department and later to sales. Before his recent promotion he was vice president of the West Coast office.



PRESIDENT H. G. Adams of the new advertising firm of Benson Adams Inc., recently formed in Portland, Me., is in position to sell advertising. Adams has been in advertising for over 12 years, including four years in the advertising department of Wright Aeronautical.



AND VICEPRESIDENT of Thomas Gray who moves to his new job after four years with Wright's Public Relations Department where he was assistant editor of the well-known Trade Winds. Previous to his employment with Wright Aeronautical he was in newspaper work.

AVIATION ENGINEERING

New Army Photo Ship

The Army Air Corps is now making tests on the largest airplane it has yet purchased for purely photographic use. The ship is a conventional six-engine biplane with a job modified to permit the handling of aerial mapping cameras. It will take two of any type of camera the army uses.

The ship is a Boeacraft, type PB, the first to be delivered of a \$228,000 contract held by the North Aircraft Corp., Fairport, 1,000 yards and powered by two Raytheon, 250-hp. Pratt & Whitney engines. The ship is an all-metal, low-wing monoplane with a wingspread of 41½ feet. It carries no armaments.

This is the first air cargo ship in which, as it comes from the manufacturer, two V.C.A. cameras can be mounted in tandem. The T-3-A is a five-engine, six-camera ship. It is a cargo ship. The camera covers a large area on the superior capabilities.

Wright's 2600 h.p. Approved

FROM THE C.A.A. comes the announcement that the 2600 hp engine that has been under extensive laboratory and flight tests recently by the American Aeronautics Institute, has been given a type certificate for use in aircraft. The engine is an 18-cylinder air-cooled radial de-



APRIL 1940

A BRITISH JOB: This looks like a plumber's pipe-dream, but in reality all of that iron pipe work in the center are the clamps for holding the necessary parts in a streamlined Elton biplane.

veloping 2600 hp on takeoff. This engine, built primarily for use in large transport aircraft, is the most powerful engine ever certified for commercial purposes in this country.

Radios For North Beach

Future Trans-Atlantic radio receivers, free from interference to a very marked degree, have been installed at La Guardia Field. The installed units, of course, in the master key to the stations, and to

avoid confusion it is a prerequisite to have this type of radio-frequency free receiver. The uses of the dipole are spread the sounds of the receiver constantly toward them by a device known as an electronically operated "modulator" in the absence of a signal the receiver appears dead, sound coming only when the error wave from a plane's transmitter is picked up at the receiver frequency.

The air lines are designed to supply day and night channels, with one receiver constantly being tuned to 600 KC. The frequency for Army aircraft. The voice of private flyers come at once a definite frequency of 1800 KC, and a telephone frequency of 1800 KC. The two additional receivers are maintained as emergency spares, with a possibility that additional channels will be allocated to them in the future.

From The N.A.C.A.

In a way of reflecting up some N.A.C.A. research and changing into the present but, here are several that are being constructed over the properties which. For instance, it is particularly significant that the N.A.C.A. has a new plane, maybe by its design, which runs at 100 m.p.h. and a super-light sound engine which will give all present air-cooled motors a run for their money.

in possible per horsepower. Here's what appears to be the real deal. The wing is the result of research in a new principle, with the aim of reducing wing drag to perhaps as low as one-eighth of the best present-day designs. Known as the engine still seems to be shaded in secrecy, but a new cooling system on a single cylinder with the aim of cheaper cylinders, with cooled up cooling, seems to be part of the story. At the present, however, without a whole new engine, but it looks as though we should not ourselves ready for a couple of radical designs.

Navy's Landing System

Through the use of ordinary needles on a dial at the top of the instrument panel, the Navy pilots at the Naval Air Station, Lakehurst, N. J., have been perfecting a system by which they locate land landings (see photo). The new system, employs a 2,000-foot length of cable, buried underwater, the runway, through which it did a 600-ampere alternating current. This sets up a magnetic field which is picked up by a signal in the ship controlling the needles (similar to those used on an airplane's compass). A pilot, who is flying dead, by watching the deflection of the needles in his plane approaches the flying field, and lands the runway accurately and close in for a perfect blind landing. The beam that is set up by the electrical cable has an effective range of 1,000 feet.



APRIL 1940

MAGNETIC BEAM: Another one of the blind landing systems that is under current development is the "magnetic beam" system used at the Naval Air Station, Lakehurst, N. J.



DUE AT 15,000 FEET IN 4½ MINUTES...

This new Vultee Vanguard Interceptor Pursuit is on the line ready to go. In a moment a test pilot will climb into the cockpit and head it down the runway and into the sky on an other test run. Developed in secrecy and built to rigid specifications, the Vanguard is one of the fastest and most advanced airplanes of its type in the world today. It has the same inherent adaptability to quantity production that is characteristic of the Vultee Valiant Bom-

and Advanced Trainers, and the famous Vulture Attack Bombers now serving in the air forces of many nations. In recent months Vultee production facilities have been more than doubled to meet current production demands.



VULTEE AIRCRAFT, Inc.

VULTEE FIELD, DAYTON, OH., CABLE ADDRESS "VULTEE"



R. B. TUST BET-SUP: The R. B. Tust-Bet-Sup, New York, uses this arrangement of apparatus for turbine aircraft spare parts. In the center of everything is the laboratory test engine hooked up to a dynamometer, with the power of the engine being used as a method of determining the best spare parts.

Howard



The new Howard, model 15, powered with Jacobs 220 HP engine

THE HOWARD MODEL 15—Superior in Performance, Construction and Flight Characteristics

Professional and private pilots who fly or have flown the Howard unite in declaring that it is the best performing and smoothest flying cabin plane in its class.

New Models Now in Production

The new Model 15 re-engineered Howard's superior merits, offering even better performance with extensive improvements and refinements that add to the comfort and pleasure of pilot and passengers.

The current issue of *Howard Aircraft* illustrates and describes the new Howard in detail. It will be sent to you on request.

★ **A Better Ship for Business Builders**—A Howard more truly conserves executive mental and physical energy. A Howard opens new horizons into business, creates added opportunities and helps to attain new goals. Inquiries from executives and organizations interested in a Howard are cordially invited—write for the *Howard Aircraft*.

Specification and Performance Data

Elsewhere in this Directory issue will be found detailed specifications and performance data on the new Howard equipped with various powered engines. Compared with other ships in Howard's price-power-capacity group, now Howard's wing loading factor, load carrying capacity without sacrificing performance, and its adaptability to every potential use.

Howard Superiority Flight-Proved

Thousands of hours of cross-country flights under all conditions by factory and owner pilots now conclusively prove that the Howard actually rides out flat better than anything in its class! Let us prove it to you by a demonstration flight.

AVIATION OPERATORS CORNER

The Cavalcade

Big news in January for operators, as word of the big airplane manufacturers, was the success of the cavalcade in Florida. By actual count, 414 ships were at Orlando on three very close and unofficial figures at the end of the maneuvers showed a grand total of 700 airplanes had reached Miami. Many of these ships had plowed through snow and ice on their way to the sunny south.

The maneuvers this year were the most popular yet and should cause great interest in private flying. There is a lot of competition for operators to see in the fact that over 100 ships, most of them in the light plane class, came from all over the country from all parts east of the Rockies and actually set in their destinations many hundreds of miles away. This is proof that airplanes will take you there and back.

Most exciting event of the three days meeting was the flight of the Macomber Trophy Race. It is G. L. Lusk, flying his Bonanza in from St. Louis, was first time of \$1,000 and the trophy. Lusk's flight was covered by Russell Edelman.



WHEN A REALITY QUEEN OF AN AIR MEET really knows how to fly—there's something right there! was seen "the Miami Division" and promptly stepped out of the usual reality's role by leaving to fly.

The program started last June 1st and up to the present more than 1,200 persons have become knowledge students and



PART OF THE AIR ARMADA AT MIAMI. They were all there—big and little—comparing the greatest airplane show in history.

who flew a Lockheed 21 from Roosevelt Field. Third honor went to Ed. Carr in a Beechcraft which he flew from Los Angeles. Macomber Trophy Race winner was Ken Olson in the Bonanza. Trophy for being first plane in the Bonanza Division was won.

A unique four-way championship in competition, a large air company, a plane manufacturer and a service mission in taking place three days in the New York City area which they interest a number of operators.

The program is called "Wings for America" and the participants are Carl Evers of Flight Research Field, Standard Oil Company of New Jersey, Laconia, Virginia Corp., and the N. Y. Museum of Science and Industry. All were delighted with the program's success.

In the morning, one of the country's most progressive, a certain big name has made the aviation displays. Ten times during the day and evening a surprise take short version phases of aviation world. As there is a Link Trainer which is assembled at each corner of a full-sized Laconia and plenty of other equipment, the service has lots of interest. At the close of each lesson a drawing is held and two winners are offered free flights with Carl Evers, Laconia. Conclude. Those who don't win are given a chance to try an extraordinary field at the reduced rate of \$1.50. All who take flights are made members of "Evers' Club" and may get a \$10 membership in the club of flight training given by Evers.

The program started last June 1st and up to the present more than 1,200 persons have become knowledge students and

where flight. More than 300 flights have been paid for by individuals who did not win free flights.

About 41,000 people attended the event of the Museum and a total of 1,000 flights were made in the first seven months. About half of the winners actually went out in the field to take advantage of the flight offer. 50 persons taking flights, 50 signed up for a course of lessons with Evers, and it actually took in airplanes. At this writing about half have completed the course. Evers uses four Laconia ships for his work.

If you stay in of the Reading, Pa., airport three days you're likely to see the "Evers' Bonanza" competing in and out. Evers brought the ship in by five official and technical from Evers.



H. C. RANKIN FLEW HIS BEESCHRAFT in Miami that brought in the Bonanza in the Macomber Trophy by race. Left to right: Rankin, Bonanza Manufacturer, Waterbury, Waterbury has a right to be in this happy place because his ship was one of the first three planes.

ing to the Chicago factory and to make offers in Boston, Columbia, Baltimore and Kansas City. H. C. Rankin is pilot.

The Southern Nevada Air Club has brought new interest and activity to that part of the country in recent months. A successful air show was staged at Las Vegas, Nevada, just before Christmas. Plans were made to fly from Nevada, California, Utah and Arizona. Local merchants helped to underwrite the cost of the show by providing money for the materials and prize money for the winners.

Some 5,000 interested spectators came to watch the competition. Howard Aircraft put on a complete exhibition. Tom C. Lusk among the visitors with his personal jumping and

HOWARD AIRCRAFT CORPORATION

5301 WEST 65TH STREET • CHICAGO, ILLINOIS

TAGGING THE BASES

with USS REMOTE



Youth Will Be Served

Youth will be served in many ways by the several recently devoted plans to encourage aviation training of the right kind. Staffed and based on the C.A.A. Flight Training Program with 10,000 worth of scholarships and awards to be administered to participants by the Staff of the Associated General Aviation of America is getting underway on its educational program which includes arrangement of model building and other indoor activities in schools, and also throughout the country. Service-downward Scholarship winners are hard to work in government and colleges throughout the land. These and other similar activities are also being carried out not only in the future strength of the aviation industry but in coming generations of our citizens.

First comes get a kick out of watching systems for around hangars, looking for a place to hold their wings, but for those operators who have to keep their engines around-side with their feathered friends would that start soon. William R. Kent and Freddy Lerner of Southern Air Services have solved the problem by adding to their personnel a "son" named George, who will right to work and cleared the hangar in a week. And the birds don't mean back while George is patrolling the runways. He is needed down on the ground for a salary of one tenth of schedule mile per day.

From the Light Plane Develops come another story about age feathered friends. This time it's a little and then, J. A. West of Washington tells us that he found the right with the Many Aspects of Aviation, and was about to drop his bag into the baggage compartment of his Service personal car in the parking, when something flitted into his vision. It was the little and then about to lay on top in the compartment. So there was nothing left to do but clear the runway and the right man appeared at his feet. He was the famous flying instructor, Mr. West learned that the young children for ages in most unusual places, such as drill rooms, parking, etc.

There were numerous cases, spot landing and bomb dropping system.

A ground school has been established by the Aero Club with five courses being taught in several subjects.

How in Bangor, Texas, there is more activity than the night has seen in years. With C. J. Moon leading other friends, the airport has been improved and lighting equipment installed. Kent's Mill has opened a flying school and has a fine group of students, including the C.A.A. group from Bangor Jr. College.

Ray Taylor has issued part of Manual Number at Bushman Field, Ft. Worth, where he has set up a sales and distribution office for America. This gives

him plenty of space for plane sales and Ft. Worth will be the delivery point for most Texas. Mr. Taylor is District Manager for America and has built a new office for his business.

Good news for aviation pilots came out of Los Angeles last month when a new firm, Pacific Douglas, Inc., was launched. William Douglas, designer and well-known officer, leads the new venture. With such pilot industry names as Douglas, Grum, Vought, Miller and Fry as partners, prospects for the new enterprise look bright. The firm already has a plant in operations and promises a production of 15 airplanes a month. Rate of production should bring better prices.

REPORT CARD

Of Air School

Col. Ross Turner is busy these days getting his new flight and ground school established at the Memphis Airport in Indianapolis. From his lengthy experience in all phases of aviation, the Colonel is stressing the practical nature of the training in his aviation efforts. He predicts that the flight of Ross Turner's name, plus the fact that he is waiting for ground school these days, will not fill the school in capacity in our December issue we inadvertently reported the school to be in Kansas City. This is Col. Turner's old flying grounds, but the school is located in Indianapolis.

One of the busy flying schools of Louisiana is the Southern Av-



NUAIR HOLDS NO TERROR for private owners these days. If you are a kid and want to get up to your favorite to maintain the for a weekend of flying you are not need back by a slow and cumbersome old one if you have a child. Business efficiency shows how it can be done. On the left, the Splice 900, and on the right the five-passenger Radical.



Harvey Rayburn and Alfred Strick with three Splice airplanes such as will be produced in the new California plant of Douglas Douglas, Inc.

about school, managed by a woman. Edna Gertrude Kidd the aviation fire ship, including a Ryan 100 equipped for an instructor flight. The school is located at Bushman Airport.

Some 24 lucky students will be admitted to a new aviation maintenance training course to be started at once by United Air Lines at its Chicago, Wisconsin, maintenance base. The course will run for three years. Candidates must be high school graduates between the ages of 18 and 20 who have at least one year of aviation in a government approved school or an equivalent. Training will include theory and practice.

Foreign students continue to be attracted to the Army School of Aviators at San Diego. In recent weeks two students have come from Mexico, one from the Philippines Islands, and others from Venezuela, Mexico and Canada.



A NEW FLYING FORTRESS EVERY 4 DAYS

Every fourth working day, the huge front doors roll open at Boeing Plant No. 2, and another 22-ton 4-engine B-17B bomber emerges, ready for check flight and delivery to the United States Army Air Corps.

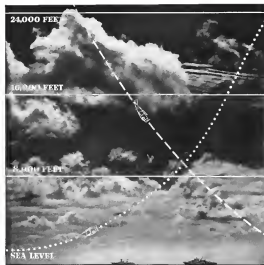
This schedule, which a few years ago would have seemed unreasonable for planes of this size, has now been in effect for several months. The formidable Flying Fortresses are being turned

out on a production line basis, which permits stepping up schedules to a still faster pace as required.

With a background of full experience in the 4-engine airplane field, both military and commercial, and with new advanced designs in process, Boeing is completely geared for further production of modern 4-engine types. Boeing has always built tomorrow's airplanes today!



BOEING AIRCRAFT COMPANY
SEATTLE



At ALL altitudes, at ALL throttle positions



Repeated test and accumulated service experience have proved that the new Stromberg Injection Carburetor accurately maintains the pre-determined best mixture ratio, under all conditions, by fixed size metering jets. Because of this, less and economo-

cal settings may be used with safety, and important gains are obtained in fuel economy and cruising range.

**BENDIX PRODUCTS DIVISION
OF BENDIX AVIATION CORPORATION
SOUTH BEND, INDIANA**

NEW STROMBERG INJECTION CARBURETOR

AVIATION
DIVISION, 1936
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AND NOW... Learadio rides the Chicago & Southern Airlines with its GOVERNMENT-APPROVED AUTOMATIC DIRECTION FINDER



As featured by the CAATC, the Learradio ADF is a high accuracy aircraft radio receiver for continuous use in navigation, which automatically indicates the direction of the radio beacon—providing continuous and accurate direction finding information.

To its already famous service between Chicago and New Orleans, the Chicago and Southern Airlines now adds even greater comfort, security and luxury with a great new fleet of Douglas DC-3's, equipped throughout with Learradio Automatic Direction Finders. How natural it is to combine the ultimate in modern transportation with the ultimate in navigation instruments! Every day finds new names added to the distinguished roster of governments, commercial carriers and private pilots making use of the tremendous advantages offered by Learradio Automatic Direction Finders. With its new and greatly enlarged production facilities, Learradio is now, better than ever, equipped to supply all the aircraft radio requirements of service and commercial operations.

LEARADIO

LEAR AVIA, INCORPORATED, DAYTON, OHIO
Aircraft Division: Research Park, Dayton, O. 5,
N. Y. Radio Division: Los Angeles Municipal Air-
port, Hollywood, Cal. Wichita Division: Bush Aircraft
Corp., Wichita, Kansas. Export Dept.: 31 Shaw St., N. Y.

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WARNER



SUPER SCARAB "165"

The Warner Super Scarab, delivering 165 H.P. at 2100 R.P.M., brings Warner reliability, responsiveness and operating economy into the higher horse power bracket. The thrill of that smooth flowing power is at its peak in the super "165" . . . every modern refinement in engine construction is incorporated in this latest addition to the already distinguished line of Warner Scarab Engines—Write for literature and specifications.



Warner Carburetor Fuel Control Units, with timing mechanism which automatically compensates for temperature changes, are used in such as B & B, Aero-Craft, Waco, Beech, Cessna, and Bell, Yale, etc., and other.



ENGINES
90 H.P., 125 H.P., 145 H.P., 165 H.P.

WARNER AIRCRAFT CORP.
DETROIT, MICHIGAN

Manufacturers of Aircraft Engines, Airplane Wheels and Brakes, Shock Struts, and Many other Aircraft Accessories.

B&G

LEADERSHIP

YEAR AFTER YEAR **B&G** SPARK PLUGS ARE SPECIFIED AND USED AS STANDARD EQUIPMENT BY LEADING ENGINE MANUFACTURERS AND BY LEADING COMMERCIAL AIRLINES. OWNERS OF PRIVATE PLANES ALSO INSIST UPON THEM. TWENTY-TWO YEARS OF RESEARCH AND DEVELOPMENT IN A BASICALLY SOUND PRODUCT TO KEEP IT ABREAST OF THE DEMANDS OF THE INDUSTRY, ACCOUNTS FOR THIS UNIVERSAL DEMAND. ONLY A PRODUCT SUPERIOR IN CONSTRUCTION AND PERFORMANCE COULD ATTAIN SUCH RECOGNITION.

THE B&G CORPORATION

Contractors to the United States Army, Navy and Coast Guard and Aircraft Engine Builders

136 WEST 52nd STREET, NEW YORK, NEW YORK

SWEET RUNNING ENGINES

Don't "Just Happen"!

IT IS Permite's pioneering experience in the aluminum alloy field plus Permite's engineering skill, laboratory facilities and distinctive heat-treating practices, that enable us to supply officially approved aluminum alloys for aircraft engine parts made to standards established by the Federal Specification Board, U. S. Army Air Corps and Navy Aircraft Department.

No wonder so many of today's leading aircraft engines run sweeter, need less overhauling, because of the Permite aluminum alloy crankcase covers, cylinder heads, bearings, pistons and other Permite castings.

Permite valves and piston pins also are used as standard equipment in many of today's aircraft engines.

Recommendations and quotations on your requirements will be submitted without obligation.

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Pioneer Producer
of Aluminum Alloys

PERMITE *Aluminum Alloy* CASTINGS

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P L E X I G L A S

The colorless transparency of PLEXIGLAS sheets, here shaped to conform to the contours of the Martin 167 Bomber, will withstand the severest weather conditions.



Canopy of 11 Martin 167 Bomber in flight

Permite is the standard. See P. 145, Vol. 137, for the aluminum alloy castings used in the design of the Martin 167 Bomber.



RÖHM & HAAS COMPANY, INC.
222 West Washington Square, Philadelphia, Pa.

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PROOF

... On-to-Miami Race for Macfadden Trophy

JANUARY 6, 1940



Place	Type Airplane	Year Made	Engines	Pilot	Average Speed
1	Beechcraft 188*	1939	2-450 H.P. P&W	Rankin	204+
2	—	—	2-450 H.P. P&W	—	206+
3	Beechcraft D17S	1938	450 H.P. P&W	Cason	194+
4	Beechcraft D17R	1935	450 H.P. Wright	Ming	194+
5	Beechcraft D17S	1937	450 H.P. P&W	Gimbal	192+
6	Beechcraft 18D	1938	2-370 H.P. Jacobs	Proctor	191+
7	Beechcraft C17R	1936	450 H.P. Wright	Pomeroy	179+
8	—	—	450 H.P. P&W	—	177+
9	Beechcraft F17D	1938	300 H.P. Jacobs	Poster	155+

*Highest speed ever established by any NC licensed airplane in an R. A. A. sanctioned event

THE record of Beechcraft performance stands truly based upon official records of FREE-FOR-ALL cross country events. The above list of the BEECHCRAFT procession is the recent ON-TO-MIAMI event for NC licensed airplanes is merely a confirmation of past performance as recorded in other similar events. Some of these Beechcrafts are several years old and have flown many hundreds of hours. At least two of them have flown completely around South America.

The policy of the Beech Aircraft Corporation has been to design and build airplanes with exceptional flight stability, low wing loading and low landing speeds, easy handling qualities, and extra ruggedness, to overcome adverse operating conditions in remote localities.

BEECHCRAFT speed is a product of clean design and careful attention to details of construction

and finish. The importance of high speed is considered secondary to the good qualities mentioned above. It is because of the fact that BEECHCRAFT wing loadings, per square foot of area, are the lightest in their respective weight classes. It would be easy to increase BEECHCRAFT speeds by cutting down wing area to equal those of competition. To do so would entail a sacrifice of some of the finest qualities of all BEECHCRAFTS.

There are other airplanes of comparable size and power with advanced speeds in excess of those published by BEECHCRAFT. When the FREE-FOR-ALL events are recorded, the name of BEECHCRAFT is described regularly among the winners. In the quad of transcontinental races and other long distance events the true facts of performance become so plainly apparent that they are unmistakable.

BEECH AIRCRAFT CORPORATION

6411 EAST CENTRAL • WICHITA, KANSAS, U. S. A.

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February 1940

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BEECHCRAFT "D17S"

PERSONNEL TRANSPORT



Is Equipped with

NORMA-HOFFMANN PRECISION BEARINGS

The plane here pictured—one of several supplied the U. S. Navy—is typical of the series of 5-passenger ships of this model built by the Beech Aircraft Corporation, Wichita, Kan., for private, commercial and military use.

NORMA-HOFFMANN PRECISION BEARINGS are used in the 450 H.P. Pratt & Whitney 5B Wasp Junior Engine, in the aileron control system, and elsewhere in the plane itself.

"Where the bearings must not fail" — on land, at sea, and in the air — practically every representative feature of aircraft, engines, instruments, and aircraft equipment — including the U. S. Government — employs NORMA-HOFFMANN PRECISION BEARINGS as an added assurance of safety, friction-free operation, long service, and low maintenance cost.



There is a NORMA-HOFFMANN PRECISION BEARING for almost every known application — in sizes and over 500 different types — including aircraft, engines, instruments, and aircraft equipment. Write for the Catalog. Low freight rates with you.

NORMA-HOFFMANN BEARINGS CORPN., STAMFORD, CONN. U. S. A.

AVIATION
February 1940

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ANOTHER CONTINENTAL EXCLUSIVE



FUEL INJECTION

Continental Now Offers Its Famous "A" Series 4-Cylinder Aircraft Engines A-65, A-75, A-80, with

MECHANICAL FUEL INJECTION

... An Exclusive Feature

Continental saves again with another technical advancement in light aircraft dependability and economy. Continental aircraft engines are now available with fuel injection (equal mechanical distribution of fuel to each cylinder). The outstanding advancement, a real development of Continental engine engineering and the high fuel injection Corporation, is an exclusive Continental feature.

Fuel injection allows more power, more on fuel, more smoother operation and complete dependability in every emergency position. The fuel injection is a feature of complete engine design to make a good fuel engine injection.

Most important of all, it automatically increases endurance flying time.



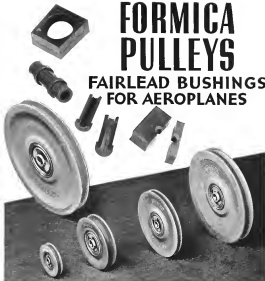
It will varied that up on standard customers as engine injection. The fuel injection system is a feature of complete engine design to make a good fuel engine injection. The fuel injection is a feature of complete engine design to make a good fuel engine injection.

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FORMICA PULLEYS

FAIRLEAD BUSHINGS FOR AEROPLANES



UNUSUAL stability of dimensions as well as lightweight have made Formica control pulleys, fairlead bushings and other fabricated parts popular for aeroplanes. A large percentage of the American ships that have taken the air in recent years have been equipped with them. Formica pulleys will assist Army and Navy

specifications as to material, strength and workmanship. They are constantly being tested and checked under those specifications for weight, run out tolerances, static load, bending, flange shear and resistance to fatigue. Formica table tops and interior paneling are used also in passenger planes.

THE FORMICA INSULATION COMPANY
4628 Spring Grove Avenue, Cincinnati, Ohio

FORMICA

AVIATION
February, 1941
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HALL makes BLIND GRINDING as practical as BLIND FLYING

This new improved Model AW HALL WET TYPE ECCENTRIC Valve Seat Grinder grinds broken, hard steel and alloy seats to a position and finish that permits bleeding in 100% in an average of 5 minutes per seat. EXAMPLE: 9 steel and 9 bronze seats of a Pratt & Whitney Wasp engine have been ground in 2 hours elapsed time. Honing or fly cutting of bronze seats is eliminated wet grinding provides uniform wheel loading and prevents scoring or surface burning of the seat.

The HALL AW handles practically all valve seats in radial type cylinders and has built-in, motor-driven Pump, 5 gal. capacity Sump, Diamond Dresser for accurately dressing grinding wheels to angles of 15, 20, 30, 45, 60, 70 and 90 degrees and many other important features. HALL PLATON are of new over painted design which feeds the work center at top and bottom of a bellmouth guide.

This and other HALL Aviation Grinder models are in use by world's largest Governments at Army and Navy Repair Bases as well as by Transport Companies and Engine Manufacturers.

At night it enables size of valve seat being ground in a radial type cylinder. HALL ECCENTRIC Grinder feeds the grinding wheel at a rate speed (16,500 R. P. M.) while traveling around on the job in the seat with an ECCENTRIC speed of 50 R. P. M. This patented grinding principle is incorporated in no other seat grinder. Others are full size valves which are confined to wheel loading, wheel breakage and seat damage.



HALL ECCENTRIC Valve Seat Grinders are also available for straight-in-line engines. Write for complete descriptions HALL Grinders, Valves, Refactors, etc.

HALL WET TYPE VALVE REFACTOR

Aviation demands the HALL WET TYPE Valve Refactor for working valve face with the same precision, finish and freedom from surface scoring recommended in HALL ground valve seats. The HALL Model 80 Valve Refactor has many features of special importance to the aviation field including a patented spiral design collet which holds the valve stem securely yet exerts "freezing" of relief contact points over the valve stem which is often scarce with collets of other type. Write for complete information.

THE HALL MANUFACTURING COMPANY, 1634 WOODLAND AVE., TOLEDO, OHIO

HALL

WET TYPE

VALVE and VALVE SEAT GRINDERS

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A TOUGH AIRPLANE FOR A TOUGH JOB

FAIRCHILD M-62 TRAINER

The first thing the critical observer will note in the Fairchild M-62 Trainer is its modern military design—full cantilever, low-wing monoplane. But solidly built-in behind that design is a built-in suggestion of structure sufficient to meet all the various forms of violence that helpings seem to be increasingly able to meet. The M-62 is built to the rigid standards of the U. S. Army Air Corps, which specify a strength factor of 10 rather than the 7 or less usually offered by commercial aircraft.

Furthermore, the size, weight, and flight characteristics of the M-62 provide a remarkably easy transition to combat-type aircraft. Its gross weight of 2,550 pounds

makes the student pilot to acquire the big ship "feel" from the very start of his training. Large, roomy, Army-size cockpit of standard arrangement afford ideal training conditions for even the biggest pilots. The 115% neck loading gear track and movable tail wheel give the M-62 exceptional ground handling characteristics. And dependable power is supplied by Ranger engines from 175 to 280 hp., specifically designed for operation in twin-engine aircraft.

Now in quantity production for the U. S. Army Air Corps, the M-62 is certainly the right choice for the toughest jobs in all types of service training!

FAIRCHILD AIRCRAFT



Division of Fairchild Engine & Airplane Corporation
Englewood, Maryland U. S. A. Cable Address "Fairchild"

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February, 1947
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Economy and efficiency both contribute to the increasing use of Monsanto transparent plastics in airplane windows, deflection, cockpit covers, landing light housings or inspection panels.

Aircraft manufacturers find important economies in cost of materials and labor when Monsanto transparent plastics replace acetate or alucal is used. Monsanto transparent plastics are tough and rigid, yet have sufficient flexibility for easy installation.

Airplane covers—whether private, commercial or military—find that Monsanto transparent plastics provide excellent qualities of clarity and light transmission, and, in cases where repairs are

necessary, the ease and low cost of replacement makes for inexpensive upkeep.

As a result, manufacturers who use Monsanto transparent plastics for airplane installations discover economy in customer satisfaction with decrease in production costs. For further information, inquire: MONSANTO CHEMICAL COMPANY, Plastics Division, Springfield, Massachusetts. District Office: New York, Chicago, Denver, St. Louis, Birmingham, San Francisco, Los Angeles, Montreal.

New Monsanto Serves the Aviation Industry

Among the more than 360 products of Monsanto Chemical Company used directly by the aviation industry are:

- PLASTICS—Transparent plastics for windows and other areas where visibility is necessary. Copolymer plastics for tanks and ribs.
- LACQUERS—for coatings and finishes.
- SOLES—for floor surfaces.
- ADHESIVES, PRIMER, FINISHES, SOLVENTS, THERMOSETS.
- CHEMICALS—for fuel, oil, engine parts, more efficient fuels and lubricants.



At Left—Training in classroom. Below—Flight Training.



Wherever You Want to Go in Aviation Parks LEADERSHIP TRAINING Prepares You for Greater Opportunity

Whether you want to go in aviation into airline piloting, operations, maintenance, engineering, sales or executive positions—you'll find that the aviation industry recognizes and accepts the value of Parks training. This acceptance is particularly valuable now with the aviation industry expanding rapidly, for one reward of expansion is promotion—without exception for those who can carry it accompanied by increased compensation.

Here's proof of the acceptance of Parks' training: during the past 35 months, 41 per cent of Parks graduates secured their first positions in aviation before graduation, and the balance obtained theirs within a period of 5 weeks and four days after graduation. These subsequent successful careers prove that they were equipped to take advantage of greater opportunities.

Parks works closely with the aviation industry and Parks trains you to meet their strictest requirements. As a Parks graduate you have the advantage of knowing that the knowledge and skills acquired at Parks constitute a sound and well-balanced background. You are qualified to step into leadership in whatever branch of aviation interests you the most.

Parks provides a college education with specialized training in the four major branches of aviation: Professional Flight and Executive, Aviation Operations and Executive, Maintenance Engineering and Aeronautical Engineering. To prepare yourself for success in aviation get the complete story of Parks training at once. The coupon brings you the new 64-page booklet without charge or obligation. Mail it today.



Below—Operations and Executive Training.



At Left—Training in airplane simulator.

* Accredited by the Superintendent of Public Instruction of the State of Illinois, Civil Aeronautics Authority approved as an advanced flight and ground school and mechanics school. Accredited by and co-operating with the United States Army Air Corps in giving flight and mechanics training, and for representation in the U. S. Naval Reserve for flight training.

Parks Air College
Rox St. Louis, Illinois

Please send me directly of Parks Air College course in commercial aviation training.

Name Age

Address

City

State

Zip

PARKS AIR COLLEGE

Rox St. Louis, Illinois

MONSANTO PLASTICS
SERVING INDUSTRY... WHICH SERVES MANKIND

UNSURPASSED

for
MILITARY
and CIVIL
TRAINING
PURPOSES



The superiority of Kinner Engines which is characterized by these features has been demonstrated in over 100,000,000 miles of successful operation.

Enduring Kinner Engines operate at low r. p. m., and at low compression which means less wear and strain on parts and greater propulsive efficiency. Reduced operating costs are the direct result. Kinner economy is world famous!

Interchangeability Every part in Kinner Engines is 100% interchangeable. Because of reliable construction, Kinner production is completely standardized. You can buy any Kinner part at any time and know that it will fit!

Reliability That Kinner Engines have flown a distance equal to 4000 times around the world—under every condition for the past 15 years—is a record by which Kinner stands and long life may be measured.

Easy Maintenance Simplicity of design and construction permit rapid service on Kinner Engines, even where special facilities are not available. For the same reason repair overhauls are based on carbon clamps.

Low Cost Today, under the new Kinner company, priced facilities are being increased to permit a quantity of 3000 engines per year. This makes present Kinner low prices possible.

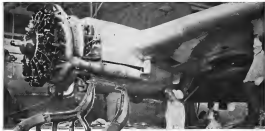


KINNER MOTORS, INC., GLENDALE, CALIFORNIA, U.S.A.

AVIATION
February, 1935
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THERE'S A STORY BEHIND

the Stainless Manifold



U.S.S. Stainless Steel now widely acknowledged as "best" for exhaust manifolds

Of all the many improvements recently introduced in modern aircraft, the stainless steel manifold stands out as one of the most notable achievements. You would have to look far and wide to find a more difficult set of specifications to meet. The list of requirements:

1. High strength and failure strength at prolonged operating temperatures (800° to 1000° F.)
2. Minimum corrosion resistance in acid and "dry" acids and atmospheres
3. Minimum shrinkage during or after heat treatment
4. High resistance to surface abrasion or attack of metal in metal contact
5. Resistance to vibration stresses such as deep down-draw bending and twisting

When aeronautical engineers began their search, many doubted that any metal could be found that would meet

all five of these requirements. But they finally turned to a stainless steel, which is not subject to intergranular corrosion. Working in close cooperation with our engineers, they developed production specifications under which U. S. S. Stainless Steel not only met the five requirements, but did so at economical cost.

The result: the stainless steel manifold. Already this manifold construction has proved itself by establishing service records up to 7000 and some higher. And today, it is serving successfully as standard equipment on most of America's famous airplanes in civil transport and Army and Navy fighting craft. If you have not yet adopted the highly engineered manifold construction, ask one of our specialists to give you complete information. Or write today for full engineering details.



STAINLESS STEEL

AMERICAN STEEL & WIRE COMPANY, Cleveland, Chicago and New York
CARNEGIE-ILLINOIS STEEL CORPORATION, Pittsburgh and Chicago
NATIONAL TUBE COMPANY, Pittsburgh

Canadian Steel Company, San Francisco, Seattle, Coast, Vancouver, British Columbia
United States Steel Export Company, New York
South Steel Products Company, Chicago, Washington & elsewhere

UNITED STATES STEEL

AVIATION
February, 1935
125



REARWIN AIRCRAFT & ENGINES, INC. KANSAS CITY, KANSAS, U.S.A.

LONG LIFE at LOW COST
that's the
KEN-ROYCE ENGINE

★ Exceptionally long life, low maintenance and interlocking side parts and smooth, consistent creases make the KIM NOVICE (formerly Lifford) replace the chain of mannequin heads and wigs in more than 10 different countries.

KIMBORCE engines are used by the U. S. Army Air Corps and by many aircraft manufacturers in the United States and abroad. They are ideal for sport and primary flying planes.

EX-100 engines are available in three models: EX-100-17F—17hp and EX-100-22F—22hp. All have direct injection carburetors and automatic oilers. On Ex-100s, Model 100-17F and EX-100-22F have latest type "instant" kill, built around cylinder barrels which give extra safety between your hands than any other and many other important improvements. One-hour consumption on EX-100 is 2.5 gallons per hour... EX-100 consumes 7 gallons per hour. All models are available with full pressure fueling, starter, generator, radio, blower and other accessories.

Production facilities enable us to offer these superior sunglasses at exceptionally low prices. For complete details, contact your local sales office or write: SUNGLAR.



UPPER ABOVE Model 32 has three angles 115° by 115° open. A/C is. As an extension of our permanent trays and membranes, they has gotten to the knowledge a newly developed better in any 800-BUTTON valve ball during the past 10 years.

REARWIN AIRCRAFT & ENGINES, INC. KANSAS CITY, KANSAS, U.S.A.

Take **YOUR CHOICE**

★ These great airplanes . . . designed and built to meet the requirements of varying airplane buyers. The one you buy depends on your needs. But, regardless which you choose you can be sure you're getting superior design, quality construction, top performance. Get More for Your Money . . . BUY A BEECHER!

THE CLOUDSTER Each, tribo, streamlined, the CLOUDSTER is equipped with either 80 hp or 110 hp speeds running KENDRIDGE motor. It has plenty of reserve power for low wind performance under all conditions. The cable, designed for comfort, is extremely quiet, automatically up hoisted, unusually easy. All models have a range of over 600 miles and drive from 110 mph to 125 mph depending on accessories.

THE SPORTSTER For 1968 the popular SPORTSTER has streamlined, aerodynamic styling giving greater visibility, completely redesigned, smooth S&K cooling providing greater speed, full pressure balling, increased cubic inch, smoother cubic upturning. Cruising speed has been increased to nearly 110 mph with output of 140 miles. The SPORTSTER is ideal for sport or pleasure riding.

THE SPEEDSTER Most efficient tandem stylemate of 128 hp in America. Glides 1000 feet first downwind, 5000 feet in five minutes. Actually carries 128 miles an hour. Team called for advanced training and spent one

With TODAY let your editors quote complete details and specifications for these THREE popular BEAUFIN AIRPLANE!

Watch for the introduction of our new low cost light airplane available in the same colors.



Editorial: C. Alan Flannery

The very first Kollsman instrument made—back in 1928—was developed for the U. S. Naval Air Service. Not only have the ensuing years witnessed many more Kollsman Precision Instruments developed for the Navy, but year after year has marked Navy procurement of Kollsman Instruments in ever-increasing number.

KOLLSMAN INSTRUMENT DIVISION OF THE SQUARE D COMPANY
8008 FORTY-FIFTH AVENUE, ELMHURST, NEW YORK
WESTERN BRANCH: GRAND CENTRAL AIR TERMINAL, GLENDALE, CALIFORNIA

All Metal
Cost Less
One Piece
Weigh Less
Self Locking
Outlast the Plane
Nothing to Dry Out
Millions in Service

BOOTS

AIRCRAFT NUTS

Authorized for Use on All Types of Aircraft
—Navy, Army, and Commercial

Outlast



the Plane

Manufactured & Distributed by
SCOVILL MANUFACTURING CO.
WATERBURY CONNECTICUT

Lumbers of Boats (General) Met Corporation

AVIATION
February, 1940

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in Aviation Radio
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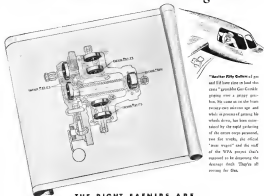
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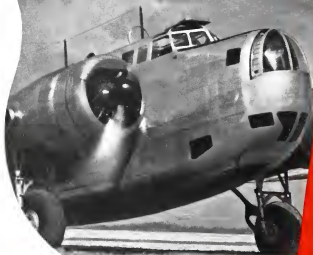
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